National Aeronautics and Space Administration

NASA DEEP SPACE HUMAN EXPLORATION SPACECRAFT ORION:

A CASE FOR SMALL BUSINESS

Office of
Small Business Programs (OSBP)
where small business makes a **big** difference


ULA

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Message from the NASA Administrator

In 2010, at the Kennedy Space Center, President Obama set new goals for space exploration: to send humans to an asteroid for the first time in history by 2025 and to send crews to orbit Mars in the mid-2030s.

NASA embarked on this new goal by turning over the delivery of cargo and crew to the International Space Station and other low-Earth destinations so that we could concentrate on building America's next-generation space exploration system—the Orion crew vehicle and the Space Launch System (SLS).

NASA's Orion crew vehicle is being built to take humans farther than they have ever gone before. Orion will serve as the exploration vehicle that will carry the crew to space, provide emergency abort capability, sustain the crew during space travel, and provide safe reentry from deep space return velocities.

This publication highlights some of the dedicated and mission-focused work of our small business suppliers that have played a role in the success of the Orion program. Lockheed Martin, NASA's prime contractor for the Orion development, has amassed over 800 small business suppliers in 47 states. All of the small businesses involved have been essential, and their skills and dedication will continue to be critical as we pursue new ways of doing business, new efficiencies, and new directions that will give us new capabilities for exploration.

In December 2014, the Orion Exploration Flight Test 1 (EFT-1) performed a near-flawless flight test on its first journey to space. The Orion program team is reviewing EFT-1 test data from this amazing flight. The results gleaned from that test flight will assist in the preparation for its next launch aboard our SLS rocket and its future with astronauts aboard exploring farther into our solar system than ever before.

Small businesses are critical partners in NASA's work to create that future, and together we're opening the next era of space exploration. I want to thank the small business community for your hard work with the Orion crew vehicle. Your contributions are one of NASA's most valuable assets, and each day you are helping us to create the world's strongest space program. Godspeed—and go, Orion!

Charles F. Bolden, Jr.
Administrator

NASA OSBP VISION STATEMENT

The vision of the Office of Small Business Programs at NASA Headquarters is to promote and integrate all small businesses into the competitive base of contractors that pioneer the future of space exploration, scientific discovery, and aeronautics research.

MISSION STATEMENT

- To advise the Administrator on all matters related to small business,
- To promote the development and management of NASA programs that assist all categories of small business,
- To develop small businesses in high-tech areas that include technology transfer and commercialization of technology, and
- To provide small businesses with maximum practicable opportunities to participate in NASA prime contracts and subcontracts.

Message from the Office of Small Business Programs Associate Administrator

On Friday, December 5, 2014, NASA reached new heights and accomplished yet another major milestone by launching the Exploration Flight Test-1, the first test flight of the Orion Multi-Purpose Crew Vehicle. This test enabled Orion to travel farther into space than any human spacecraft has gone in more than 40 years.

This publication highlights the amazing accomplishments and extraordinary efforts of over 800 small businesses located across 47 states that have contributed to the Orion program. These companies have provided an array of products and services to support the program, from heat shields and thermal protection systems, to engineering and procurement services—not to mention fasteners, media converter boxes, radiators, thermal/pressure windowpanes, and forward bay cover thrusters.

These featured small businesses are just a sliver of the numerous high-tech firms that enable NASA to complete its missions. They have been able to perform under rigorous standards, and due to their success, have witnessed growth in revenue, personnel, and organizational capabilities. Several of these small businesses have received various awards and recognitions, including NASA's Agency-Level Small Business Industry Awards, the Johnson Space Center Small Business Industry Award, and Lockheed Martin's Rigel Award.

The NASA Small Business Program has the ardent support of the Agency's senior management, the NASA Mission Directorates, acquisition personnel, and the mission support offices. I would like to especially recognize Administrator Charles F. Bolden, Jr.'s commitment to the program. In addition, I would like to thank William McNally, Assistant Administrator, Office of Procurement; the Center Directors; and the Procurement Officers located at each of the Centers. The NASA Small Business Program would not be as successful without the dedication and hard work of the Agency's Small Business Specialists. They have the tough assignment of ensuring small businesses are afforded maximum practicable opportunities to participate in NASA prime and subcontracts.

Another special recognition goes to the Center Small Business Technical Advisors and Small Business Technical Coordinators who collaborate with the Small Business Specialists to interpret technical capabilities and assist them in identifying accomplished small businesses. These companies prove that when opportunities arise, they can get the job done.

In closing, I want to thank these companies and all other small businesses that support NASA every day in various capacities that enable the Agency to be successful. Without their dedication, NASA would not be able to accomplish as much as it does. As you can see from the small businesses included in this publication, NASA is an Agency "Where Small Business Makes a Big Difference."

Glenn A. Delgado
Associate Administrator
NASA Office of Small Business Programs

Letter from the Orion Program Manager

NASA's Journey to Mars travels through Orion's award-winning small businesses in 47 states. Our small business partners have supported NASA and Lockheed Martin from the program's inception in 2006 and were key to our recent success on NASA's Exploration Flight Test-1.

The talents and accomplishments of our small business partners are part of our strategic business approach and help us to improve communication, resolve issues, meet schedules, and deliver quality materials and products.

A series of increasingly challenging missions awaits, and America's new Orion spacecraft will take us farther than we've gone before, including to Mars. We are proud to have small business with us as we travel to destinations across our solar system.

Mike Geyer
Orion Program Manager


FORKLIFT PROHIBITED

Letter from Lockheed Martin's Orion Program Small Business Advocate

In 2006, when Lockheed Martin was named Orion's prime contractor, we weren't the only ones celebrating. Over half the work on the program was planned for our proposal team partners, some of which were very large. Today, the makeup of the program team looks pretty much the same. Major partners continue to play a vital role; however, small business subcontractors and supply chain vendors far outnumber the large businesses working on the program.

At the time of this publication, Lockheed Martin has paid over $600 million to small businesses, with a commitment that will eventually reach over $1.3 billion. These are impressive numbers, but even more astounding is the fact that they only represent a portion of Orion's contributions to small business. We flow our small business goals to each of our subcontractors, and this generates hundreds of millions more dollars of opportunity to hundreds more small businesses. It'd be a real challenge to try to figure out exactly how many small businesses have benefitted from this amazing program so far, but one thing is certain—America's small businesses are helping to build a spacecraft that will take humans farther into space than ever before. And Lockheed Martin and NASA simply couldn't do it without them.

Small businesses can be found integrated throughout every team on the program. They sit beside us in meetings and design reviews. They are in consoles, in test labs, and on the final assembly floor. They build equipment that can withstand a rocket ride out of Earth's orbit and the harsh environments of deep space. They perform services and deliver exceptional products quickly and affordably. Small businesses do just about everything there is to do on the Orion program.

They design.
They write code.
They check drawings.
They mitigate risk.
They conduct trade studies.
They analyze environments.
They run thousands of simulations.
They braid wire.
They forge and bend metal.
They mold and shape composite materials.
They make "rad-hard" electronics.
They test.
They verify.
They build.
They deliver!

It's exciting to watch new small businesses join the program. They often win contracts with solutions that are more innovative, efficient, or affordable than that of their large competitors. They invest in new personnel, equipment, and certifications to provide a capability the program needs. They consistently go above and beyond, and they get recognized by NASA for it. Their businesses grow, and, as a result, the industry grows.

In this publication, you'll read many success stories, but I think the greatest success is seeing the Orion small businesses prove what the SBA, NASA, and Lockheed Martin have been saying all along: "Doing business with small business is the right thing to do!"

Michelle Butzke
Orion Program Small Business Advocate
Lockheed Martin

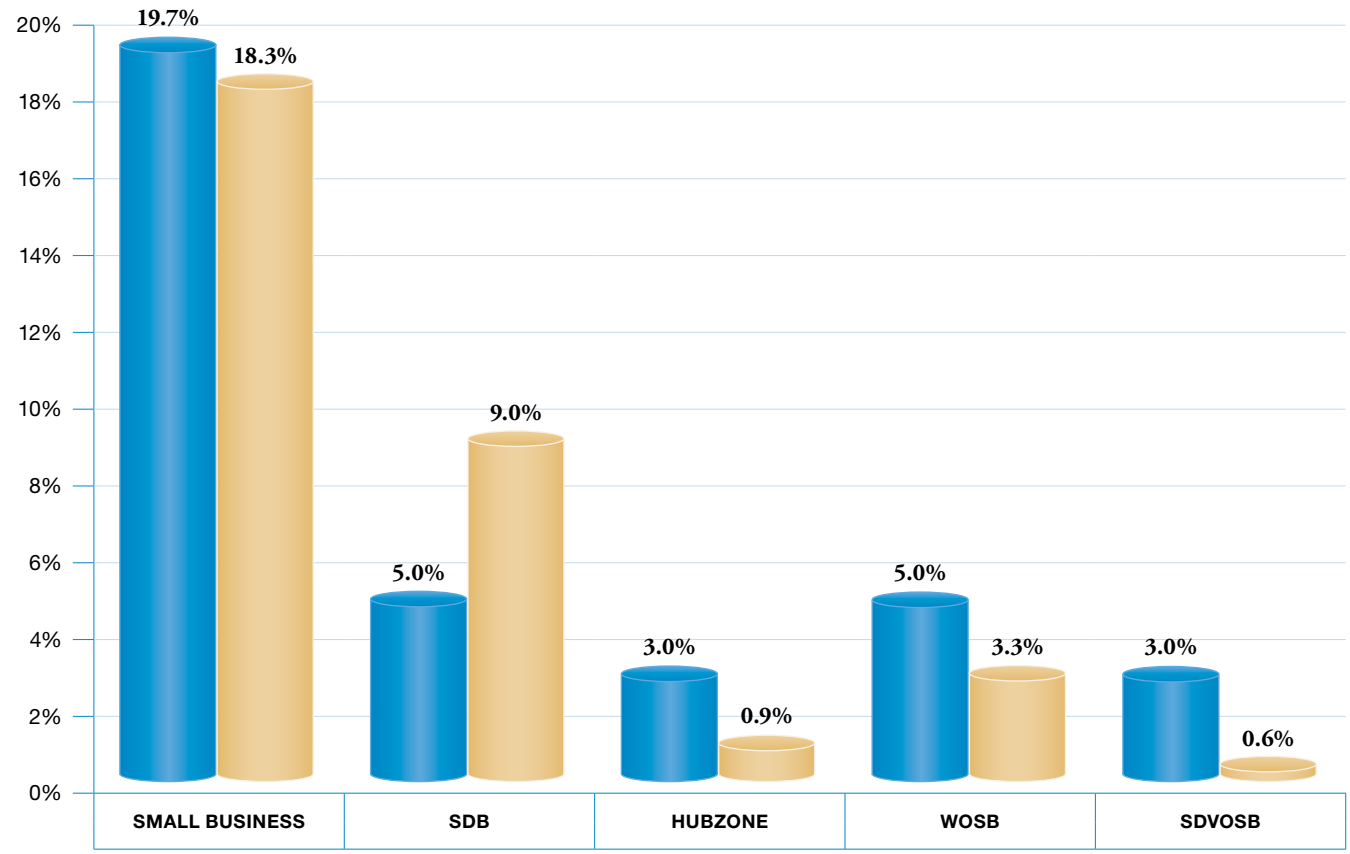
The Metrics: Small Business Achievements at NASA

NASA AGENCY FISCAL YEAR 2014 SMALL BUSINESS PRIME METRICS*

GOALS VS. ACTUAL PERCENTAGES

Data generated February 24, 2015, from the Federal Procurement Data System–Next Generation (FPDS-NG)

CATEGORY	DOLLARS
Total Dollars	$13,587,478,963
Small Business	$2,492,257,544
Small Disadvantaged Businesses (SDB)	$1,219,935,564
Historically Underutilized Business Zones (HUBZone)	$117,502,821
Women-Owned Small Businesses (WOSB)	$448,503,471
Service-Disabled Veteran–Owned Small Businesses (SDVOSB)	$78,097,211



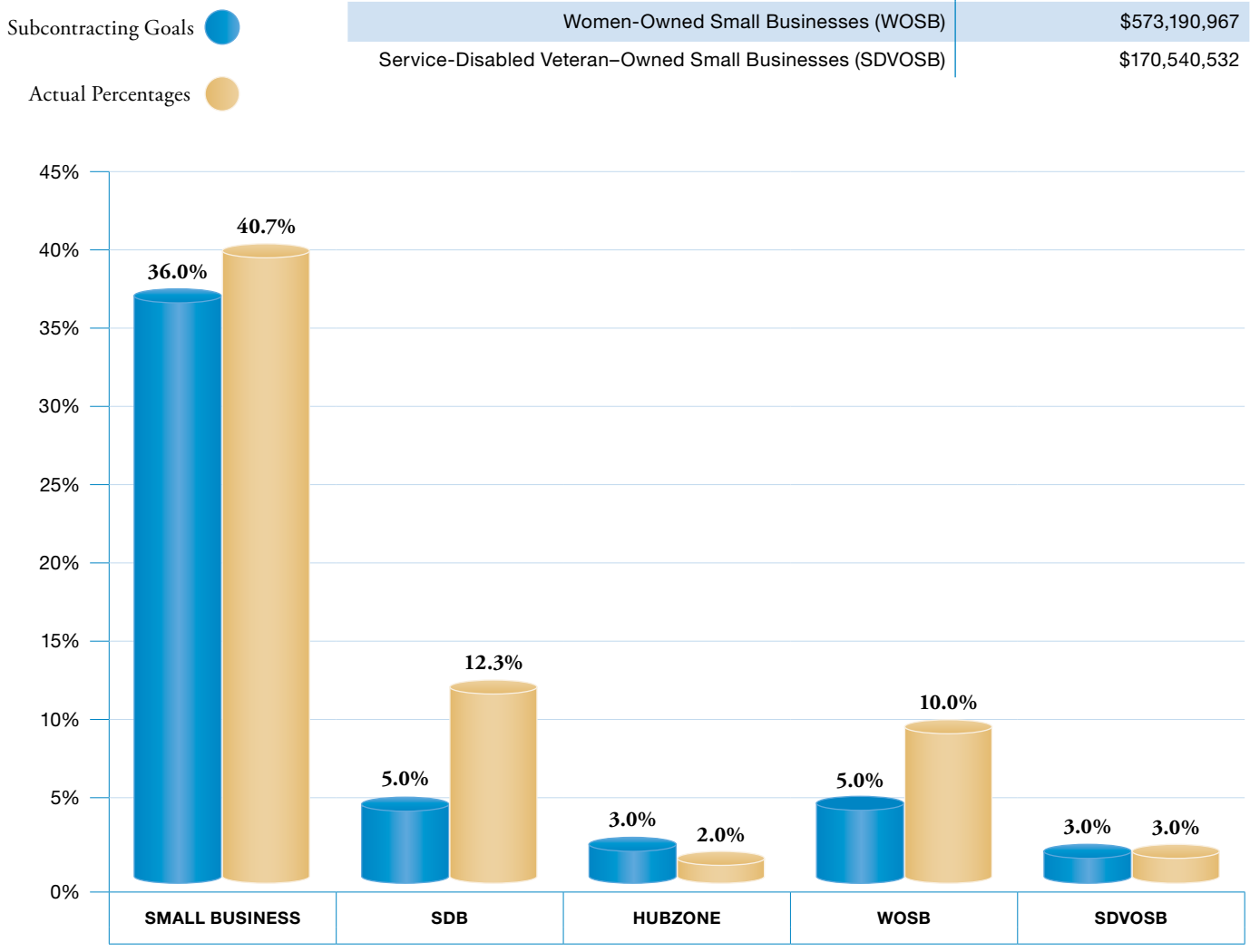
*Final FY14 prime metrics data provided by the Small Business Administration

NASA AGENCY FISCAL YEAR 2014 SMALL BUSINESS SUBCONTRACTING METRICS*

GOALS VS. ACTUAL PERCENTAGES

Data generated March 13, 2015, from the Electronic Subcontracting Reporting System (eSRS)

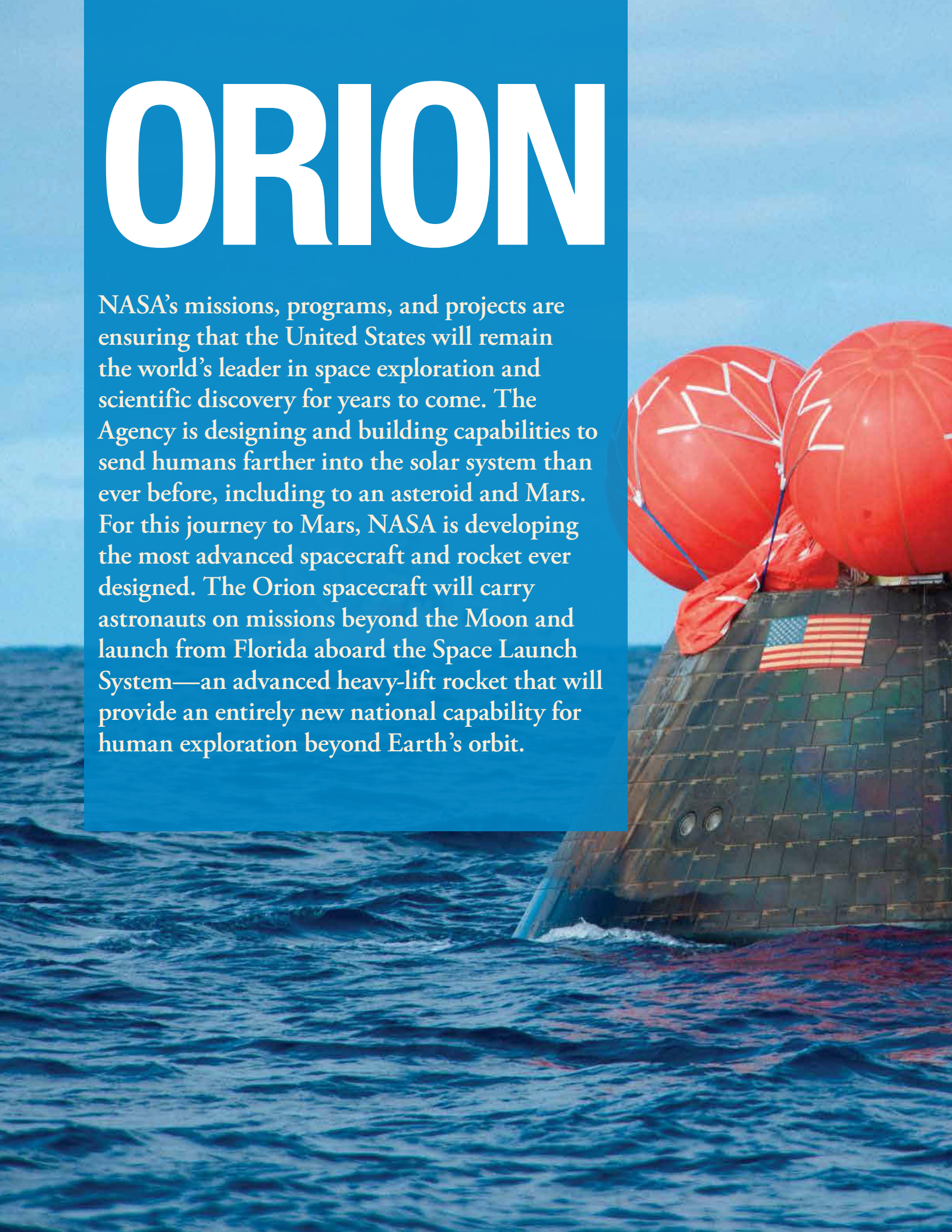
CATEGORY	DOLLARS
Total Dollars	$5,709,520,186
Small Business	$2,321,194,036
Small Disadvantaged Businesses (SDB)	$701,200,399
Historically Underutilized Business Zones (HUBZone)	$114,750,096
Women-Owned Small Businesses (WOSB)	$573,190,967
Service-Disabled Veteran–Owned Small Businesses (SDVOSB)	$170,540,532



*Final FY14 subcontracting metrics data provided by the Small Business Administration

ORION

NASA's missions, programs, and projects are ensuring that the United States will remain the world's leader in space exploration and scientific discovery for years to come. The Agency is designing and building capabilities to send humans farther into the solar system than ever before, including to an asteroid and Mars. For this journey to Mars, NASA is developing the most advanced spacecraft and rocket ever designed. The Orion spacecraft will carry astronauts on missions beyond the Moon and launch from Florida aboard the Space Launch System—an advanced heavy-lift rocket that will provide an entirely new national capability for human exploration beyond Earth's orbit.



About the NASA Deep Space Human Exploration Spacecraft Orion

Orion is enabling NASA to reach for new heights and reveal the unknown so that what we do and learn will benefit all humankind. The spacecraft will serve as the exploration vehicle that will carry astronauts to space, provide emergency abort capability, sustain the crew, and provide safe reentry from deep space return velocities.

In December 2014, Orion successfully completed a two-orbit, 4.5-hour flight that tested many of the riskiest events Orion will see when it sends astronauts to deep space. It traveled farther into space than any spacecraft designed for astronauts had gone in more than 40 years. The flight test was designed to provide critical data NASA needs to improve the spacecraft's design and reduce risks to its future crews. The test evaluated launch and high-speed reentry systems, such as avionics, attitude control, parachutes, and the heat shield, and demonstrated major separation events, such as the launch abort system jettison and the service module fairing separation.

Orion's performance during the flight test is informing how we design, develop, and build future spacecraft. Teams around the country are making progress developing and building the next Orion to fly atop the Space Launch System. Orion's next flight, Exploration Mission-1, will integrate the spacecraft and the rocket and send an uncrewed Orion to a distant retrograde orbit around the Moon, where NASA will relocate an asteroid in the 2020s.

SPACECRAFT COMPONENTS

Orion is made up of four primary parts: the crew module, the service module, the launch abort system, and the Orion-to-stage adapter.

Orion's crew module will protect future astronauts during launch, provide them an area in which to live and work in space, and return them safely to Earth at the mission's conclusion. The module was built to support a crew of four for up to 21 days in space; however, the module can also house a smaller crew for a longer period or up to six astronauts for either a shorter period or with the addition of a habitat module for extended missions. The crew module is the only portion of Orion that returns to Earth at the end of the flight.

The crew module's primary structure is made of aluminum and aluminum-lithium, with a friction-stir-welded pressure vessel covered in tiles that makes up Orion's back shell. The crew module also includes a forward bay cover, which protects the top of the spacecraft during flight and reentry through Earth's atmosphere, and 11 parachutes, which slow the spacecraft down for a relatively gentle splashdown in the Pacific Ocean.

Orion's service module is designed to be the powerhouse that fuels and propels the Orion spacecraft in space. Located directly below the crew module, it will contain the in-space propulsion capability for orbital transfer, attitude control, and high-altitude ascent aborts. It will also generate power using solar arrays and provide thermal control, water, and air for the astronauts until just before their return to Earth, when it will separate from the crew module. NASA is working with the European Space Agency (ESA) to build the service module for Exploration Mission-1.

Orion's launch abort system will make it the safest spacecraft ever built for humans. Positioned atop the crew module, it is designed to protect the capsule during ascent and pull it—with astronauts inside—away from a failing rocket on the launch pad or during the first few minutes of launch. On crewed missions, it will be able to activate within milliseconds to pull the capsule away and position it for landing.

The Orion-to-stage adapter connects Orion's service module to the rocket below. The adapter provides structural support to Orion and electrical interfaces between the spacecraft and the rocket.

Advanced Solutions, Inc.

Small Business

Tell us about your company's history and capabilities.

Advanced Solutions, Inc. (ASI), is an aerospace engineering company started in 1999 by Allen Bucher, John Cuseo, and Mike Morris to aid businesses become more efficient and profitable via hardware and software automation. ASI was founded to integrate new technology into space systems to reduce the cost to develop and operate space assets while significantly increasing their capability and responsiveness. ASI specializes in guidance, navigation, and control (GN&C) systems; flight software (FSW); spacecraft assembly, integration, and test (AIT); spacecraft mission operations; spacecraft command and telemetry systems; aerospace ground data systems; and dynamic space simulation. Our experience spans both civil space (NASA, commercial) and DOD (Air Force Research Laboratory, classified) programs as well as several research and development projects (internal R&D, NASA and AFRL-SBIR-funded R&D).

How many employees does your company have?

ASI has grown from a company of 3 to 36 full-time employees and 5 full-time subcontractors. ASI currently has 15 engineers supporting various NASA contracts (including Orion). The remainder of the staff is dedicated to other R&D efforts to make NASA programs more efficient and successful.

How long have you supported the Orion program?

ASI has supported the Orion program since Orion's Pad Abort-1 test. Our first employees started in the vehicle main computer test bed (VTB), integration and testing (I&T), and the Ground Data System (GDS) areas in the summer of 2007.

Describe what services or support you provided to the NASA Orion program.

ASI provided experienced engineers to support key roles in the integration and testing of the crew module in Denver and Kennedy Space Center and in GDS design and implementation for all program locations (Colorado, Texas, and Florida). ASI employees Angie Williams (I&T), Nicole (Ramos) Pacewalk (I&T), and Allen Bucher (GDS) all held console positions during the launch and mission operations. ASI employees/subcontractors Owen Short (GDS), Lee Stoumbaugh (GDS), Susan Babcock (GDS), Olivia Fuentes (GDS), and Bruce Bieber (I&T) also played key roles during development and mission operations. Angie and Owen have been recognized several times during the program as key contributors. Angie was the engineer on console sending commands to Orion during all of the prelaunch activities.

How has your business evolved or grown supporting the Orion program?

The Orion program has provided a chance for some of our employees to be part of a large, highly visible NASA program that will set the stage for future space missions. Our company and employees have been fortunate to be part of NASA planetary exploration for 15 years, working on some of the most exciting NASA spacecraft programs. These opportunities provide our employees with many valuable and rewarding experiences, which help make ASI more competitive in the market and also provide knowledge for our in-house research and development. The high-profile nature of the work ASI employees get to take part in helps us attract top-notch employees.

Describe future endeavors for your small business with NASA and/or the Federal Government.

ASI has supported 15 NASA flight programs including Orion and is currently supporting Mars Odyssey, MRO, MAVEN, JUNO, and future missions InSight and OSIRIS-REx. ASI is also actively supporting the USAFA FalconSat program. ASI prides itself on being a recognized expert in the areas of GN&C, I&T, flight software, and ground systems. Our plan is to continue to be a value-added teammate to NASA, the Federal Government, and Lockheed programs.

Angie Williams, Nicole (Ramos) Pacewalk, and Allen Bucher watch as Orion rolls out of the Operations and Checkout Building at Kennedy Space Center.

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Alejo Engineering, Inc.

Small Disadvantaged Business, Woman-Owned Small Business

Tell us about your company's history and capabilities.

Alejo Engineering was started in 2004 and provides services in probabilistic risk assessment; reliability and maintainability engineering; safety and hazard analysis; materials science and engineering; and systems engineering, primarily in the aerospace and aviation sectors. In April 2006 the company was certified as a participant in the U.S. Small Business Administration's 8(a) Business Development Program. We have supported NASA Headquarters and over 20 NASA programs in these engineering and scientific areas, and we are one of the primary authors of NASA's Probabilistic Risk Assessment (PRA) Guidebook.

How many employees does your company have?

Our company has three employees.

How long have you supported the Orion program?

We have supported the Orion program for over 6 years.

Describe what services or support you provided to the NASA Orion program.

We supported Lockheed Martin during the proposal phase in doing preliminary PRA work, helping formulate the Reliability and Maintainability (R&M) plan, and providing general R&M support. We provided similar support on the development contract and helped NASA with the Constellation PRA.

How has your business evolved or grown supporting the Orion program?

Our business grew with the help of NASA and Lockheed Martin during this time. We were able to venture further into the aviation sector with the lessons learned from this program and the skills we developed. It was a great opportunity to network within the NASA and Lockheed Martin communities as well.

Describe future endeavors for your small business with NASA and/or the Federal Government.

Our primary business remains local to us in California with both the Jet Propulsion Laboratory and the aviation industry. We don't see the large "Cadillac" NASA missions anymore, but, hopefully, NASA will pursue the bigger and better missions in the future. We hope to see the Orion program really take flight and do what we designed it to do!

The full United Delta IV Heavy with Orion on top.

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All Points Logistics, LLC

Service-Disabled Veteran–Owned Small Business

All Points employees Soha Alqeshawi, Jason Stelly, Bohdan Scharunovych, and Steve Peters operate in the Houston-based Exploration Development Lab to integrate Orion flight and ground software for simulation and testing.

Tell us about your company's history and capabilities.

Since 1997, All Points has earned a stellar reputation with customers at NASA, the Department of Veterans Affairs (VA), the Department of Homeland Security, the Missile Defense Agency (MDA), and the National Security Agency (NSA) and has been recognized for our dedication to excellence and innovation. The All Points team applies state-of-the-art analytical tools combined with industry-leading techniques and thought-leadership to deliver critical data and designs for spacecraft, sensors, weapons, IT, and communications systems to our customers. Our commitment to best practices is evident in our ISO 9001:2008/AS9100 certifications as well as our team, which is composed of individuals who hold L6S Black Belts, PMI, ITIL v3, and CMMI certifications, along with expert-level ISO training. All Points' consistently excellent ratings culminated in our selection as the recipient of the NASA 2011 Agency-Wide Small Business Subcontractor of the Year Award.

How many employees does your company have?

All Points has a workforce of 230 employees supporting NASA's Orion, SLS, GSDO, and ISS programs, with approximately 25 percent providing support to the Orion program.

How long have you supported the Orion program?

All Points has been supporting the Orion program since January 2013.

Describe what services or support you provided to the NASA Orion program.

We provided support to Lockheed Martin and the Orion program in the areas of systems engineering, design, development, integration, and testing; formal verification and validation of the flight and ground systems software; software test automation; processes and tools for software reconfiguration; software configuration management engineering and development; wire harness design and integration guidance; navigation and control testing; assembly, test, and launch operations; avionics, power, and wiring; and materials and processing for the crew and service model and launch abort system.

How has your business evolved or grown supporting the Orion program?

All Points has increased its workforce by 30 percent, enhanced program management capabilities, and significantly expanded operations in Sunnyvale, CA, Houston, TX, Denver, CO, Glendale, AZ, and Kennedy Space Center, FL. Our entry to the Orion program in 2013 was instrumental to winning the Lockheed Martin Civil Space (LMCS) contract award in 2014. As a LMCS prime contractor with 12 subcontractor teammates, we now have expanded our support within Orion and added space exploration support to OSIRIS-REx, GOES, MRO, MARS Odyssey, MAVEN, InSight, and JUNO.

Describe future endeavors for your small business with NASA and/or the Federal Government.

Whether a prime or a subcontractor, All Points consistently provides mission-focused, critical services to our customers. All Points delivers software, systems engineering, and operations and maintenance expertise to NASA, the VA, the Federal Emergency Management Agency, the MDA, and the NSA. We utilize a variety of work control systems, integrating personnel, technology, and services to control operational costs. Our expertise includes flight software, IT, sensor programs, and intelligence data that contain a broad range of design and analysis support for aerospace, mechanical, electrical, fluids, and structural systems. The All Points team applies state-of-the-art analytical tools and employs industry best practices while delivering critical data and designs for spacecraft, sensors, weapons, IT, and communications systems to our customers.

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Arcata Associates, Inc.

Small Disadvantaged Business

Tell us about your company's history and capabilities.

Arcata Associates, Inc., a Nevada-based engineering and technical services company, has supported NASA for 26 years. The company currently supports NASA Armstrong Flight Research Center (AFRC) as a subcontractor to Inuteq on Research Facilities & Engineering Support Services (RF&ESS); Goddard Space Flight Center (GSFC) as a sub to Inuteq on Program Analysis and Control IV (PAACIV); Johnson Space Center (JSC) as a sub to Lockheed Martin on Orion; Marshall Space Flight Center (MSFC) as a sub to Teledyne Brown Engineering on Mission Operations & Integration (MO&I); and the NASA Shared Services Center (NSSC) as a sub to Computer Sciences Corporation (CSC). NASA has recognized Arcata with the following awards: 2011 and 2008 NASA Small Business Prime Contractor of the Year; 2013, 2011, 2010, and 2008 AFRC Small Business of the Year; and 2008 NSSC Subcontractor of the Year.

How many employees does your company have?

Arcata has over 400 employees in eight states.

How long have you supported the Orion program?

Arcata has supported the Orion program since contract inception in 2006.

Describe what services or support you provided to the NASA Orion program.

Arcata currently provides supply-chain, quality, and subcontract data management services. In the past, Arcata also supported the Orion program's balanced scorecard implementation and test and evaluation. Lockheed Martin Space Systems Company (LMSSC) selected Arcata Associates, Inc., as its 2013 Rigel Award winner. The Rigel Award is Lockheed Martin's Small Business of the Year Award that is given to a small business subcontractor who performs above and beyond its contractual commitments. The award is named after Rigel, the brightest star in the Orion constellation.

How has your business evolved or grown supporting the Orion program?

We are immensely proud to support Lockheed Martin's Orion program to design, develop, test, and manufacture NASA's next space vehicle to take humans to Mars. Lockheed Martin has been a phenomenal prime contractor and has shared with us their best practices in supply chain management, quality, software development, information assurance, and test and evaluation. We have incorporated many of these best practices into our company and will leverage this expertise to improve the support we provide to current and future customers.

Describe future endeavors for your small business with NASA and/or the Federal Government.

For over a quarter of a century, Arcata Associates, Inc., has been honored to be a NASA contractor. Our history spans the launch of the Cosmic Background Explorer, the development of the Mars Sojourner, the return to flight of the Space Shuttle, the testing of the Blended Wing Body, the development of the James Webb Space Telescope, and the initiation of the Orion program. We are proud of our past role in pursuing NASA's vision: "To reach for new heights and reveal the unknown so that what we do and learn will benefit all mankind," and we look forward to continuing our support of NASA in the future.

Tim Wong celebrates winning the Lockheed Martin Rigel Award with NASA Associate Administrator Glenn Delgado.

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ASRC Federal Space and Defense

Small Disadvantaged Business

ASRC Federal Space and Defense technicians at Kennedy Space Center work on the Orion crew module in preparation for EFT-1.

Tell us about your company's history and capabilities.

ASRC Federal Space and Defense brings a 15-year history of delivering high-performance space systems engineering, integration, and satellite operations services to civil and defense agencies. ASRC Federal Space and Defense provides these services throughout all phases of the program life cycle and across the entire space systems architecture, including space and ground assets. Capabilities include space operations; space systems engineering; assembly, integration, and production; and technology services. ASRC Federal Space and Defense is part of the ASRC Federal enterprise, which has been in existence since 2003 and provides a broad array of engineering, IT, logistics, and technical services and solutions to the civil, defense, and intelligence Federal services market.

How many employees does your company have?

ASRC Federal Space and Defense has 811 employees.

How long have you supported the Orion program?

ASRC Federal Space and Defense has supported the Orion program for more than 2 years, beginning in August 2012.

Describe what services or support you provided to the NASA Orion program.

ASRC Federal Space and Defense provides a highly trained and certified workforce that is embedded under Orion Lockheed Martin organizations. Most of the Orion technician workforce in Florida is employed by ASRC Federal Space and Defense. We also support Lockheed Martin with test engineers, ground and flight operations subject matter experts, avionics lab development and operations, process planning, and material handling. In addition to online vehicle manufacturing, we fabricate flight wire harnesses, electrical ground support racks, thermal blankets, thermal barriers, and thermal tile installations. Our team assembled 360 unique wire harnesses consisting of 1,028 connectors and several miles of wire in support of the crew module manufacture. We have performed over 1,000 flight-critical welds and drilled more than 5,000 precision holes.

How has your business evolved or grown supporting the Orion program?

The number of ASRC Federal Space and Defense resources supporting Lockheed Martin has tripled since 2012, partly because of our quick response to workforce needs. For example, when a previous Orion contractor's optics engineers transitioned to another contract, our company recruited and hired experienced personnel and had them on the floor within 24 hours to replace the departing team. Expanding our cadre of qualified personnel has allowed ASRC Federal Space and Defense to retain more of the displaced Space Shuttle workforce and keep these highly skilled workers available for use on Orion. Thanks to our solid performance on Orion, Lockheed Martin has utilized our skills on other contracts across the United States and uses our people for surge support at Denver, Michoud, Stennis, Sunnyvale, and Courtland.

Describe future endeavors for your small business with NASA and/or the Federal Government.

With a 15-year history of providing multidiscipline engineering services to NASA, National Oceanic and Atmospheric Administration, Department Of Defense, and industry partners, ASRC Federal Space and Defense is poised to continue providing best-value, financially attractive solutions to Government customers. As part of Arctic Slope Regional Corporation, ASRC Federal Space and Defense can readily fund startup operations and easily cover large contract payrolls, continuing resolution issues, and sizable material purchase requirements. Future endeavors include providing support for the reconfiguration of the Orion EFT-1 crew module for Ascent Abort-2, as well as planning and designing for Exploration Mission-1; providing a wide range of engineering and technical support services for NASA's Wallops Flight Facility; and working with the Air Force Space and Missile Systems Center to deliver critical launch capabilities for our Nation.

The crew module is moved and mated with the service module at the Operations and Checkout Building at Kennedy Space Center.

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ATA Engineering, Inc.

Woman-Owned Small Business

ATA engineers have supported the design of Orion's thermal protection system and its heat shield, the largest ever built.

Tell us about your company's history and capabilities.

ATA Engineering's staff has over 30 years of experience in the design, analysis, and testing of complex, highly engineered structures. ATA was formed as a 100-percent employee-owned company through the purchase of all assets and contractual obligations of the Advanced Test and Analysis group of Structural Dynamics Research Corporation in April 2000. We have grown from 28 employees to over 100 employees.

As we grow, so too do our core capabilities and expertise. From our beginnings providing advanced analysis and test engineering services, we have expanded our capabilities to include design engineering services, prototype manufacturing, and innovative hardware and software development for defense and commercial applications. We also provide turnkey design and build solutions through a network of manufacturing partners and complementary service providers.

How many employees does your company have?

ATA Engineering's staff of 117 people includes 100 degreed engineers supplemented by 5 part-time consultants and 10–15 student interns. Our staff, with an average of 14 years of experience, is distributed across the country at our headquarters in San Diego, CA, and offices in Herndon, VA; Huntsville, AL; Denver, CO; Albuquerque, NM; Seattle, WA; and Los Angeles, CA.

How long have you supported the Orion program?

ATA has supported the Orion program since its infancy in 2005 when it was called the Crew Exploration Vehicle as part of the NASA Constellation program. Our support of Orion has grown and adapted as its role within NASA has evolved.

Describe what services or support you provided to the NASA Orion program.

ATA has provided engineering support for a variety of structural stress and dynamics needs across multiple teams within the Orion program. This support includes loads definition, vibroacoustic analysis and test, multibody and flexible-body dynamics of separation events and deployments, modal and stress analysis, finite element model development and integration, and analysis process improvement through custom software tool development. The technical teams supported include the loads and dynamics, aeroshell, and systems stress groups.

How has your business evolved or grown supporting the Orion program?

Over the course of ATA's Orion support, more than 90 engineers have contributed to the success of the program, developing new methods to assess the spacecraft and its ability to explore our solar system. This work included developing a methodology, based on empirical flight and wind tunnel test data, to assess surface fluctuating pressures and vehicle responses during launch and ascent, and a methodology to couple aerodynamic loads to assessments of structural loads and contact during separation events.

Describe future endeavors for your small business with NASA and/or the Federal Government.

ATA Engineering has put forth major and continuing effort to support the development of the James Webb Space Telescope and will continue to support NASA, the Department of Defense, and their contractors with high-value engineering services and new technology development through SBIR grants. Our passion for providing innovative solutions through test- and analysis-driven design allows our customers to address their cost, quality, and time-to-market challenges. We are focused on continuing to offer the outstanding quality and performance that earned ATA Engineering NASA's 2012 George M. Low Award for technical and quality excellence.

Current SBIR-funded new technology efforts include the development of design and analysis tools for large, deployable space structures; analysis methods for hypersonic fluid-structure interaction; jet-noise characterization through new near-field acoustic holography methods; and improved predictions for new composite laminate material properties.

ATA has predicted fluctuating pressure levels and resulting structural responses for NASA's Space Launch System, Ares I, and a variety of other launch vehicles (Ares I-X pictured).

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Bally Ribbon Mills

SBIR Phase II Company

Tell us about your company's history and capabilities.

Founded in 1923, Bally Ribbon Mills (BRM) is a leader in the woven narrow fabrics industry. Over 2,000 different patterns are manufactured in our production facility located in Bally, PA. Included are woven tapes, webbings, 3D structures, and specialty textiles that cover a wide range of aerospace, medical, safety, commercial, industrial, automotive, and military applications.

Operating shuttle, needle, Jacquard, and specialty broadcloth looms, as well as modern ranges in our dyeing and finishing departments, Bally Ribbon Mills provides customers with quality products manufactured to precise specifications.

How many employees does your company have?

Nearly 300 certified employees offer the technical know-how and hands-on experience required for the production of our products, including equipment design and modification, fabric design, and weaving.

How long have you supported the Orion program?

We have supported the Orion program for 4 years.

Describe what services or support you provided to the NASA Orion program.

Bally Ribbon Mills and NASA engineers have developed Orion heatshield compression pads. These pads serve as the pass-throughs for explosive bolts that hold the capsule and command modules together prior to atmospheric entry. The compression pads serve a mechanical function while in space and a thermal protection function as part of the heatshield during reentry. Orion is much larger than Apollo, so the compression pad design for Orion became more demanding and complex, and new solutions were needed for the Flight Test EM-1 and for future human missions. The compression pad required automated weaving of the largest preforms ever: a 3" x 12" x 12" quartz fiber preform of a dense weave with a very narrow specification. BRM provided NASA with the needed preforms, which were then infused with a resin for ablative performance. These were tested and demonstrated excellent thermal and mechanical performance. Today, BRM is weaving flight hardware for the EM-1 mission.

How has your business evolved or grown supporting the Orion program?

The benefits of working with NASA and the Orion program have been numerous. Chief among them is the knowledge gained from researching, developing, and producing cutting-edge composite parts. This knowledge is applicable to many parts of our business and allows Bally Ribbon Mills to provide better service to all of our customers.

Describe future endeavors for your small business with NASA and/or the Federal Government.

Bally Ribbon Mills and NASA engineers have developed a new thermal protection system (TPS) that utilizes advanced weaving technology at BRM. Woven TPS represents a new approach to producing TPS materials: it allows for customization of material characteristics to meet specific mission requirements for protecting space vehicles from the intense heat generated during atmospheric reentry. Using woven TPS, sustainable, scalable, mission-optimized TPS solutions can be achieved with relatively low life-cycle costs, compared with the high costs and long development schedules currently associated with material development and certification. Advanced weaving techniques include: precise fiber placement within substrate, control preform density and fiber volume, and weave thick (>2") substrates with complex curvature. Future program work includes HEEET and ADEPT.

Ray Harries (left) and NASA Administrator Charles Bolden (right) make statements to the press about the importance of small businesses like Bally Ribbon Mills to the future of NASA.

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Cimarron Software Services, Inc.

Woman-Owned Small Business

Tell us about your company's history and capabilities.

Cimarron is a woman-owned small business founded in 1981. We have supported human space flight since 1988 with software engineering and real-time command and control systems for Orion, the Space Launch System, the International Space Station, the Space Shuttle, and Shuttle payloads. In NASA's Johnson Space Center Mission Control and training simulator environments, we provide engineering services for NASA's baseline Center software, computer infrastructure maintenance and upgrades, flight operations support for the front-room space vehicle control activities, and systems engineering and development to evolve current control and training infrastructures to support a new era of space exploration. Cimarron is engaged in current space exploration programs and involved in commercial efforts to develop transportation systems providing cargo resupply and crew exchange for low-Earth orbiting space complexes. Our performance has been recognized by NASA through our selection as a NASA Woman-Owned Business of the Year Award winner and as Subcontractor of the Year at JSC.

How many employees does your company have?

Cimarron is a woman-owned small business with employees throughout the United States. We are currently supporting the Orion program in Denver, CO, and Houston, TX.

How long have you supported the Orion Program?

Cimarron has been supporting the Orion program since June 2007 by providing support to trade studies, analyses, requirements definition, design, software, testing, safety, and mission assurance and operations.

Describe what services or support you provided to the NASA Orion program.

Cimarron supports Orion Data Services (ODS) tasks. ODS manages the data in support of Electronic Ground Support Equipment (EGSE), Simulation, and Flight Software (FSW). Cimarron supports the analysis, software engineering, and data management for the Orion vehicle. Our personnel analyze requirements for and then manage the development and maintenance of software and databases. We support software configuration management, maintaining the baselines for flight software, electronic ground support software, simulation software, and data management. The data encompass all parameters used for simulation, ground support, hardware, and flight software required to fly the mission.

How has your business evolved or grown supporting the Orion program?

Supporting the Orion program has allowed Cimarron to further strengthen its core competency of software engineering, information management, and configuration management. Additionally, it has afforded Cimarron the opportunity to utilize skills from prior support to NASA's International Space Station and multiple commercial customers to benefit the Orion program. An additional benefit has been working closely in support of Orion's prime contractor, Lockheed Martin. Cimarron has been fortunate to support multiple programs with Lockheed Martin for over 20 years.

Describe future endeavors for your small business with NASA and/or the Federal Government.

The capabilities and corporate infrastructure Cimarron has developed in support of Orion and other programs throughout NASA, Department of Defense, and with commercial customers for over 30 years has allowed the company to evolve into a strong, stable organization. Our focus continues to be on supporting NASA's current and new programs and drawing on best practices and capabilities to benefit those programs.

Cimarron's Software and Operations Development Lab provides facilities and tools for meeting advanced software engineering requirements.

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Coast Aerospace Manufacturing, Inc.

Small Disadvantaged Business

Work stands, ground support equipment, handling equipment, electrical test equipment, and cabling.

Tell us about your company's history and capabilities.

Coast Aerospace Manufacturing, Inc., is an SBA-Certified Small Disadvantaged Business company established in 1999. We are AS9100- and ITAR-registered, capable of design, build, and load testing of machined parts; fabrication and refurbishing of tooling; and fabrication of work stands, ground support equipment, handling equipment, electrical test equipment, and cabling. We also provide offsite services as needed.

We provide quality solutions to ensure success for the commercial, defense, and general aerospace industry.

Coast Aerospace Manufacturing, Inc., is located in Placentia, CA. With 45 employees spread over two shifts, Coast Aerospace is housed on a 58,000-square-foot, temperature-controlled facility located in the heart of the U.S. aerospace industry.

How many employees does your company have?

Currently, we have 45 employees.

How long have you supported the Orion program?

Coast Aerospace has supported the Orion program for approximately 6 years.

Describe what services or support you provided to the NASA Orion program.

Coast Aerospace supported the Orion program by machining several of the titanium heat shield struts.

How has your business evolved or grown supporting the Orion program?

Coast Aerospace has grown approximately 7 percent in personnel and revenue as a result of being involved with the Orion program and the major subcontractors for the program.

Describe future endeavors for your small business with NASA and/or the Federal Government.

We will continue our partnership with the SBA and seek further opportunities to provide quality products and on-time delivery for NASA and/or the Federal Government.

CAM-machined titanium heat shield struts for Orion program (highlighted in yellow).

Design and build (Orion program, Impact Load Simulator).

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Deep Space Systems, Inc.

Woman-Owned Small Business

Tell us about your company's history and capabilities.

Deep Space Systems (DSS) was founded in 2001 with a focus on supporting NASA's human and robotic space exploration objectives. Our mission experience includes the Mars Reconnaissance Orbiter, Juno, and Mars Odyssey orbiters; the Mars Phoenix and INSIGHT Landers; the OSIRIS-REX Asteroid Sample Return; the GRAIL Lunar Orbiter; the GOES-R series of Geostationary Weather Satellites; and the Orion Multi-Purpose Crew Vehicle. DSS provides full life-cycle support from research and development and concept definition studies and proposals through design, development, integration, test, and operations of one-of-a-kind and fleet spacecraft.

How many employees does your company have?

DSS has 30 employees working in almost every area of aerospace engineering, including software, electronics, mechanical and thermal systems, integration, test, and operations. In addition, DSS has a network of 12 large and small subcontractor teammate companies, including Stinger Ghaffarian Technologies, Intuitive Machines, Draper Labs, and Paragon Space Development Corporation.

How long have you supported the Orion program?

DSS has supported the Orion program since the Crew Exploration Vehicle competition in 2006 and is proud to have contributed to a winning proposal and Lockheed Martin's selection by NASA. Our contributions include definition of the flight avionics architecture, flight and ground software, and test systems, as well as backup, emergency, and survival systems to ensure safe crew return.

Describe what services or support you provided to the NASA Orion program.

DSS is currently supporting Orion in the following areas: systems engineering and integration; system level modeling; engineering camera system architecture; avionics requirements, test architecture, and test planning; electrical systems analysis and integration; system-level fault protection, isolation, and recovery; Safe Crew Return After Malfunction (SCRAM Team); environmental life support systems integration; spacecraft systems test and verification; assembly, test, and launch operation; passive thermal control system analysis and design; onboard and ground data systems; flight, ground, simulation, and test software development; and guidance, navigation, and control analysis and development.

How has your business evolved or grown supporting the Orion program?

DSS has tripled in size since we began supporting Lockheed Martin on the Orion proposal in 2006. In October 2013, DSS was selected as one of eight prime contractors for engineering services for Lockheed Martin Space Systems Company (SSC), which includes civil space activities from Sunnyvale, CA, to the Kennedy Space Center, FL, as well as Huntsville, AL, Houston, TX, and the Lockheed Martin SSC Headquarters in Denver, CO. For our work on Orion, DSS was selected as NASA's Small Business Subcontractor of the Year in 2009.

Describe future endeavors for your small business with NASA and/or the Federal Government.

DSS intends to continue our focus on human and robotic exploration systems and on providing the highest quality engineering services in pursuit of the Nation's space policy objectives. Our employees all share a passion for space exploration, which remains one of the most difficult and unforgiving of all human enterprises. Helping NASA succeed in extending the reach and vision of humanity into space—expanding the bounds of what is possible—is what drives all of us at DSS every day.

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EaglePicher Technologies, LLC, Yardney Division

Veteran-Owned Small Business

Tell us about your company's history and capabilities.

EaglePicher Technologies, LLC, an OM Group company, is a leading producer of batteries and energetic devices for the defense, aerospace, medical, commercial, grid energy storage, oil, and gas industries. The company provides the most experience and broadest capability in battery electrochemistry of any battery supplier in the United States. Battery technologies include lithium ion, thermal, silver zinc, nickel hydrogen, lithium carbon monofluoride, lithium thionyl chloride, lithium manganese dioxide, lithium sulfur dioxide, and reserve lithium oxyhalide. EaglePicher also provides custom battery assemblies, battery management systems, pyrotechnic devices, and other power solutions. EaglePicher Technologies is headquartered in Joplin, MO, and is ISO9001:2008- and AS9100C -certified. For more information, visit *http://www.eaglepicher.com*.

How many employees does your company have?

EaglePicher's Yardney Division employs 120 staff members at its single facility in East Greenwich, RI. As a whole, EaglePicher Technologies, LLC, has 905 employees.

How long have you supported the Orion program?

Yardney has been a critical supplier to the Orion program since its onset. State-of-the-art lithium ion cells and batteries were designed, developed, and assembled in East Greenwich, RI, and successfully flown on Exploration Flight Test-1. We are presently manufacturing cells and batteries for Exploration Mission-1.

Describe what services or support you provided to the NASA Orion program.

Four highly customized Yardney batteries provide the main electrical energy for the Orion Multi-Purpose Crew Vehicle. Upon delivery to the launch site at Cape Canaveral, these mission-critical 120Volt/30Ahr batteries were required to withstand months of onsite storage as well as endure several severe environments, including launch, abort, reentry, and splashdown on the Atlas V. The batteries are designed to be recharged via solar panels and to supply the full energy needs of the spacecraft and crew for the life of the mission. This system performed flawlessly throughout the first test flight launched in December of 2014.

How has your business evolved or grown supporting the Orion program?

Yardney has a long history of providing energy storage devices for the U.S. space program. From the early days of Apollo, Mercury, and Gemini, our batteries have powered spacesuits for extravehicular activities, rocket launchers such as the Delta II/IV and Atlas V, and landers and rovers used on the Mars Exploration Rover programs. Our work on Orion continues this long history of supplying critical batteries to programs that must survive the extreme conditions of space. Along with this success comes the credibility and confidence that Yardney-supplied products are "space-qualified"—offering us an opportunity to compete for other applications requiring this type of high performance in a variety of "stressful" environments.

Describe future endeavors for your small business with NASA and/or the Federal Government.

EaglePicher, Yardney Division, will continue to support the niche requirements of the U.S. Government. We look forward to meeting the growing energy storage needs of the space community by developing launchers, spaceships, spacecraft, and other related products for space transportation.

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Fiber Materials, Inc.

Veteran-Owned Small Business

The Orion attitude control motor Demonstration Motor-2 (DM-2) test in March 2010 utilized FMI ceramic matrix composite material in a full motor configuration. Each of the eight valves contains three components manufactured by FMI. (Photo credit: ATK)

Tell us about your company's history and capabilities.

Fiber Materials, Inc. (FMI), has supplied carbon fiber–reinforced composite materials to the space and defense industries for more than 45 years. FMI's unique capability to produce uncrimped multidirection fiber preforms has yielded a variety of mission-enabling materials such as carbon-carbon, ceramic matrix composites, and polymer matrix composites. FMI was acquired by Graftech International, Ltd., in November 2011 and is now classified as a large business, but the capabilities and commitment to support critical space and defense programs are the same.

How many employees does your company have?

Fiber Materials, Inc., currently has approximately 150 employees at two locations in Biddeford, ME.

How long have you supported the Orion program?

Fiber Materials, Inc., has been proud to support Orion since 2007 and looks forward to continued involvement in this exciting program.

Describe what services or support you provided to the NASA Orion program.

Fiber Materials, Inc., manufactures three unique components for the Orion Launch Abort System (LAS) Attitude Control Motor (ACM). These components use FMI Carbon/Carbon-Silicon Carbide (C/C-SiC), a carbon fiber–reinforced ceramic matrix composite (CMC) material. This material enables mission success by offering a high-strength, lightweight, and thermally stable alternative to exotic metals. The attitude control motor, designed and built by ATK (Elkton, MD), provides critical escape capability from the launch pad up to 300,000 feet in the event of an emergency.

How has your business evolved or grown supporting the Orion program?

Since 2007, FMI has invested in several manufacturing capabilities to better support the Orion program. Equipment has been installed at FMI to support both the ceramic processing and the component machining for this program.

Describe future endeavors for your small business with NASA and/or the Federal Government.

FMI remains engaged with NASA and the prime contractor community to support various programs. The PICA thermal protection system material, manufactured by FMI, will protect the NASA OSIRIS-REx sample return mission and is also expected to provide the heatshield for the planned Mars 2020 mission. FMI carbon-carbon materials continue to provide solid rocket motors and thermal protection for numerous defense programs.

The Orion Pad Abort-1 (PA-1) flight test in May 2010 demonstrated the full launch abort system. The attitude control motor with FMI composite hardware can be seen at the top of the vehicle spire. (Photo credit: NASA)

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Frontier Electronic Systems Corporation

Woman-Owned Small Business, Native-American Business Enterprise

Frontier Electronic Systems Orion Program Team.

Tell us about your company's history and capabilities.

Frontier Electronic Systems (FES) has excelled as an award-winning leader in the design and manufacture of innovative and affordable electronic products for aerospace and maritime Government and commercial customers since it began full-time operations in 1981. FES operates in an 86,000-square-foot engineering, manufacturing, and test facility located in Stillwater, OK. In 2014, the FES team generated $24.5 million in revenue. The company carries an excellent Dunn & Bradstreet financial health rating of 4A1 and is AS9100:2009– and ISO 9001:2008–registered under NQA. FES is certified to IPC-610, JSTD-001 Space Addendum, and NASA 8739.1-4 standards. We have earned recognition as an LMCO STAR Supplier, a four-time Boeing Supplier of the Year Award winner, and the recipient of two NASA Special Recognition Awards, and we were selected as one of five small companies to watch by Aviation Week & Space Technology in August 2013. In addition, FES was presented the Orion Multi-Purpose Crew Vehicle Program Manager's Commendation in October 2014.

How many employees does your company have?

FES has 111 professional team members. Of that number, 42 percent are electrical, mechanical, and software engineering and programming professionals; 32 percent are manufacturing technical professionals; the remaining 26 percent support the company's quality, contracts, financial, purchasing, and other integrated functions. Frontier's engineering, manufacturing, and professional support teams have more than 21 years' experience in supporting both crewed and uncrewed NASA, National Oceanic and Atmospheric Administration, and Department of Defense space programs such as the International Space Station, Orion, and the Space Launch System.

How long have you supported the Orion program?

Direct FES support for the Orion program began in 2012 with UTC Aerospace Systems (UTAS) parts management subcontracts for four circuit card assemblies (CCAs) for Orion's environmental control system. FES received follow-on subcontracts from UTAS to manufacture each of the four CCAs (28V, Environmental Control and Life Support Systems drive, load switch, and umbilical switch). Additionally, FES has provided direct design for testing, manufacturing, and test support to Lockheed Martin's Orion avionics team. The value of FES's Orion contracts exceeds $1.5 million.

Describe what services or support you provided to the NASA Orion program.

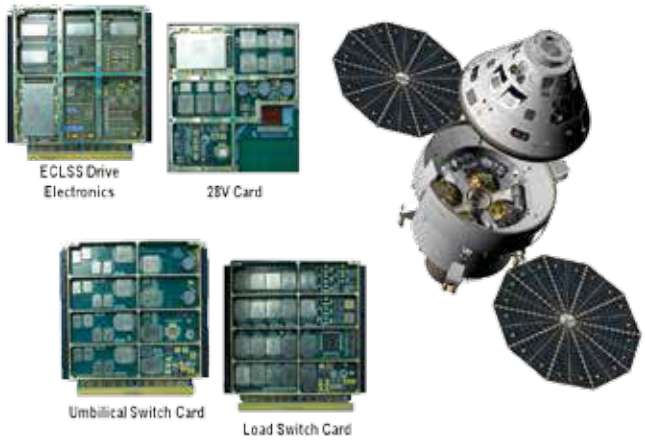
FES continues to provide direct parts management, manufacturing, design for testing, and test support for Orion avionics and electronic systems. Frontier, under subcontract to UTAS, was the first avionics supplier to deliver CCAs for Exploration Flight Test-1 (EFT-1) to Lockheed Martin. Paul Anderson, LMCO's Orion avionics subsystem manager, recognized both UTAS and Frontier achievements on EFT-1 during a special recognition ceremony at UTAS in October 2014. In addition to providing the four environmental control system CCAs for EFT-1, FES also developed the test protocols and test hardware for the media converter assembly (MCA) and video processor control assembly (VPCA) under direct contract with LMCO's Orion team. FES was recognized for professionally completing the critical testing of both the MCA and VPCA under very constrained schedules to meet EFT-1 customer requirements.

How has your business evolved or grown supporting the Orion program?

FES support of the Orion program has opened new opportunities for FES to grow its business in the Orion, Space Launch System, unmanned satellite, and military ground systems programs. FES's participation in the Orion program has also introduced us to three new customers in the aerospace and Government programs areas that FES did not have an opportunity to support prior to its high performance contributions to the Orion program. In addition to these opportunities, FES is expanding its business base with both its UTAS and Lockheed Orion customers. The Orion program has provided FES with the chance to increase career and skills development opportunities for its technical team, which is critical to the continued expansion of FES's competitive strengths in the aerospace marketplace.

Describe future endeavors for your small business with NASA and/or the Federal Government.

Frontier has built a pristine performance reputation for designing, qualifying, manufacturing, testing, and supporting technically complex aerospace and maritime electronic systems around both the Government and prime Government contractors. These customers represent approximately 98 percent of Frontier's current revenue base. Expansion of this customer base into both new Government and new commercial product areas in the aerospace and complex electronic design and build market segments is a strategic objective for Frontier. Commercial opportunities on programs such as NASA's Commercial Crew Program fit perfectly into FES's strategic marketplace and technical capabilities focus areas. Developing opportunities such as this with both new and current customers will grow FES's revenue, diversify its business base, and facilitate the growth and technical development of its team.



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GHG Corporation

Small Disadvantaged Business

Tell us about your company's history and capabilities.

GHG Corporation is a growing minority-owned organization based in Houston, TX, with a 36-year history of providing excellence in information technology (IT), quality assurance, and engineering resources and solutions. Since our inception, GHG has grown from a small operation with a handful of engineers to a thriving and dynamic business.

Over the last 30 years, GHG has built a reputation for exceeding our customers' expectations. Whether for our application development for IBM, our quality assurance and engineering support for NASA, or our commercial time and attendance software, our customers consistently praise our dedication to excellence and customer satisfaction.

How many employees does your company have?

GHG currently has 370 employees supporting several programs across the United States and Antarctica.

How long have you supported the Orion program?

GHG commenced work under a letter contract in October 2006.

Describe what services or support you provided to the NASA Orion program.

GHG provides design, development, manufacturing, testing, certification, and delivery for extravehicular activity suits, interfaces, and crew survival. GHG engineers support water/waste management and Environmental Control and Life Support Systems (ECLSS) by coordinating requirements, technical information, and interfaces, as well as reviewing and providing input for software plans. GHG provides systems engineering support for the development of system-level requirement specifications, as well as entry and maintenance of requirement data in the Cradle database, and we track requirements validation analyses to closure. GHG's software quality engineers (SQE) support the implementation and maintenance of the Orion Software Assurance Program in accordance with NASA-STD-8739.8, NASA Software Assurance Standard. GHG SQEs audit Orion software products and processes and software suppliers' internal software assurance activities.

How has your business evolved or grown supporting the Orion program?

The Orion program has enabled GHG to expand its portfolio of engineering services. Through GHG's participation in the Orion project, we have been able to expand our core capabilities in structural analysis for mechanisms, thermal protection systems, and landing and recovery systems. GHG now has the ability to perform classical stress calculations and is also now capable of providing in-depth analysis of human space flight structures thanks to personnel adept at the use of NASTRAN, PATRAN, FEMAP, and CREO/Pro-E software tools. In addition, we have added staff who can provide engineering support for the design, development, manufacturing, testing, certification, and delivery of equipment for extravehicular activity; suite interfaces; crew survival, health, habitation, and accommodation; ECLSS; and Orion flight testing.

Describe future endeavors for your small business with NASA and/or the Federal Government.

GHG will continue our tradition of providing innovative, best-in-class engineering, IT, and testing solutions to the Federal Government, building strategic relationships as a Small Business contractor, and diversifying our customer base within NASA and across the Federal Government.

GHG personnel provide IT and communications support for Lockheed Martin's Antarctic Support Contract.

GHG personnel perform rocket engine testing in support of Lockheed Martin's Test Operations Contract at Stennis Space Center.

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Houston Precision Fasteners

Small Business

Tell us about your company's history and capabilities.

Houston Precision Fasteners (HPF) was founded in 2001 by Dan Hunt, who was joined by partner Mark Hahn in early 2005. Longtime friends, Dan and Mark agreed from the start on building a business model focused on standard and expedited deliveries of high-strength, close-tolerance fasteners and machined parts for the aerospace industry. HPF has become one of the most trusted fastener manufacturers in the world for delivery-driven programs needing assured quality, teamwork, and dependable lead times. We've been fortunate enough to work with numerous organizations, including NASA, Arcata Associates, and Lockheed Martin Space Systems. HPF's drive, commitment, and investments over the last few years have catapulted us deep into the space flight industry, presenting new opportunities on a regular basis.

How many employees does your company have?

HPF has had steady staff growth over the last 10 years, beginning with a handful of employees and expanding to more than 70 dedicated team members. This number includes numerous U.S. military veterans, a result of the efforts of both owners looking for a way to give back. Improved training methods have assisted us in providing employment opportunities to those without previous experience.

How long have you supported the Orion program?

HPF became actively involved with the Orion program in early 2010 to fulfill a demand for a critical fastener. Following this opportunity, HPF worked diligently to develop strong relationships with Arcata Associates, Lockheed Martin, and numerous subcontractors and supply chain vendors. HPF is well known by the Orion program for manufacturing a wide range of fasteners under extremely tight deadlines.

Describe what services or support you provided to the NASA Orion program.

HPF has provided solutions on numerous occasions and expedited lead times for nonstock specialty fasteners for the Orion program. In 2013 HPF was awarded NASA's Small Business Subcontractor of the Year Award for being able to support several critical needs that allowed testing milestones to be completed on schedule. HPF is valued as a trusted and reliable manufacturer for urgent requirements; our team has also been recognized for exceeding expectations on numerous occasions, which led to our nomination and selection for the prestigious subcontractor award. There is always a high level of pride and excitement on the part of each team member involved in the manufacturing of Orion fasteners, and this shows clearly in the quality of the fasteners we manufacture.

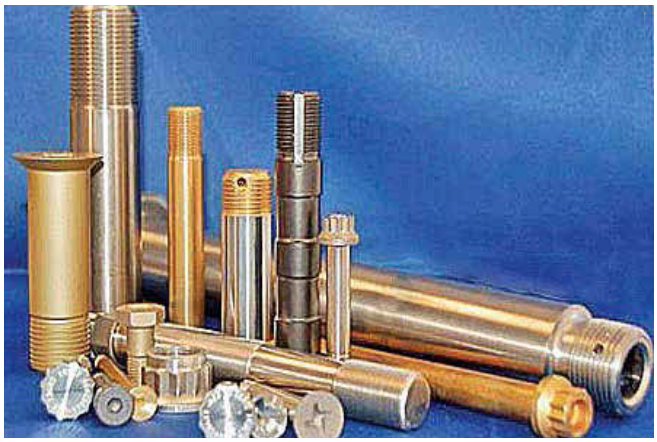
How has your business evolved or grown supporting the Orion program?

HPF realized early on in supporting Orion that for us to be more involved and valuable to the program while keeping pace with other clients, we'd need to increase our capacity in all areas of our business. The decision to make significant investments in our infrastructure was an easy one for Dan and Mark. They immediately increased square footage, completed an asset acquisition of another fastener manufacturer, direct-purchased doubling tooling and machinery, boosted employment levels, and became 100 percent self-sufficient for all processes needed for the Orion program.

These investments quickly paid off, allowing HPF to lower costs and improve manufacturing lead times in a way that was beneficial to Orion and all HPF customers.

Describe future endeavors for your small business with NASA and/or the Federal Government.

NASA is the world leader in space flight and exploration. HPF is excited to be part of history in the making. Programs such as Orion, the Space Launch System, and the International Space Station have opened new opportunities, allowing small businesses like HPF to be recognized for their hard work and participation. HPF has a bright future and will continue to support space flight endeavors in the United States by making further strategic capital investments in infrastructure, equipment, and personnel to ensure that our value as a supportive fastener manufacturer for NASA remains extremely high. Aerospace fasteners are critical to all space flight programs, and HPF will strive to stay one of the world's most dependable manufacturers in the industry.



A small variety of HPF fasteners used for aerospace applications.

HPF receiving the FY13 NASA Small Business Subcontractors of the Year Award from Rick Keegan (far right), NASA Associate Deputy Administrator, and Glenn Delgado (far left), OSBP Associate Administrator.

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ISYS Technologies

Woman-Owned Small Business

Members of ISYS executive staff attending the Orion EFT-1 launch.

Tell us about your company's history and capabilities.

ISYS was founded as a woman-owned small business in 2002. ISYS supports NASA, the Department of Defense (DOD), and several other Federal agencies from offices in Colorado and the Nation's capital. ISYS provides expertise in systems, software, and mechanical engineering; systems testing; information technology; cybersecurity; and military operations support. Much of the work we perform is in the following domains: aerospace/defense systems, satellite operations, human space flight, missile defense, intelligence analysis, airborne Command, Control, Communications, Computers, Intelligence, Surveillance and Reconnaissance, homeland security/defense, and cybersecurity. Starting as a subcontractor, ISYS has grown into a highly respected prime contractor. ISYS has received several national awards including SBA's Small Business of Excellence Award, 2009–2011, and Region VIII Subcontractor of the Year Award in 2010; DOD's Nunn Perry Award in 2011; Secretary of Defense's Patriotic Employer Award in 2014; and several local recognitions.

How many employees does your company have?

ISYS supports our Government customers with a staff of more than 200. ISYS has a team of nearly 150 and additionally manages more than 60 billable subcontractors. Our staff is made up of highly qualified engineers and technicians with expertise consistent with the domain areas we support. We take great pride in the caliber of individuals ISYS delivers to support the aerospace and defense industries and the recognition those team members receive for their efforts and commitment.

How long have you supported the Orion program?

ISYS has supported the Orion program since 2009 and has been the prime to other small businesses in many task areas. In addition to supporting Lockheed Martin on the development of Orion, ISYS has played a significant role in the public support activities surrounding the program, including the congressional level. ISYS staff has supported Lockheed Martin's commitment to STEM education and participated in many of their activities focused on raising awareness for the NASA and Orion missions.

Describe what services or support you provided to the NASA Orion program.

ISYS has provided engineering capabilities to multiple Orion functional teams. Today, we have program management oversight of approximately 75 engineers working in several functions across the program. These engineers bring specialized skills in systems/software/mechanical design and development, thermal analysis, flight software test engineering, engineering planning and scheduling, worst-case analysis, electrical design and drafting, risk integration, printed circuit board design, and stress analysis. Specifically, ISYS supported the crew module spacecraft project through the design, development, production, assembly, test, and certification efforts. This work led to the delivery of the completed spacecraft for integration with the launch vehicle and other mission elements. ISYS received the Orion Nebula Award in December 2011 for the creation of a custom configuration management tool used to track all of the hardware being used in development labs.

How has your business evolved or grown supporting the Orion program?

Since supporting the Orion program, ISYS has grown significantly in size and capabilities.

ISYS has competitively won and successfully executed 25 separate task orders with the expertise of 63 ISYS engineers and 16 subcontractors made up of small and large businesses. We have gained experience as a prime contractor, matured our internal processes, and extensively grown our engineering team. Today, we are able to reference our capabilities in systems engineering; mechanical engineering, including thermal/stress/structures analysis; computer-aided design; master planning and scheduling; and software development. We have grown our national presence, and today we are performing work in multiple locations across the country.

Describe future endeavors for your small business with NASA and/or the Federal Government.

ISYS is currently in year two of a small business prime contract with Lockheed Martin Space Systems to support six NASA programs. While much of our historical support has been on Orion, we are excited about expanding our support and earning a role on other programs. We are also in conversations with other national aerospace companies to introduce ISYS as a small business partner and prove our ability to support this community. ISYS will continue to focus its efforts on growing the breadth and depth of our engineering capabilities, increasing our staff's skillset, and taking on new challenges. We plan to achieve CMMI Level 2 status in 2015. We look forward to being part of strategic teams to influence technology, engage in new endeavors, and support the NASA mission as either a prime contractor or a subcontractor. ISYS recently won a major prime contract supporting USSTRATCOM, and we will continue to focus on growing our expertise to Department of Defense customers as well.

EFT-1 launch.

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Major Tool & Machine

Small Business

MTM has received Orion MPCV commendation for excellence in supporting the NASA Orion program with critical machined components.

Tell us about your company's history and capabilities.

Major Tool & Machine (MTM) was founded in 1946 to provide precision-machined fabrications and assemblies.

Today, MTM is housed on a 600,000–square foot campus in Indianapolis, IN.

We employ over 350 highly skilled engineers, machinists, welders, and quality assurance and support personnel.

Our focus is on providing world-class, best-value manufacturing services to mission-critical markets.

As an SBA-registered small business, we bring value through our turnkey approach, customer focus, and continuous commitment to quality.

MTM's extensive manufacturing facilities are often compared to those of Fortune 500 companies, yet our small business construct allows us to manufacture complex, highly engineered, prototype-to-production hardware at cost-effective rates.

How many employees does your company have?

MTM has 354 employees at our Indianapolis campus. Of those, 218 are skilled labor personnel, and 136 are planning, program management, technical support, and administrative personnel.

How long have you supported the Orion program?

MTM has supported the Orion program since January 2011.

Describe what services or support you provided to the NASA Orion program.

MTM provides concurrent engineering and precision machining, fabrication, and assembly services for the Orion program.

How has your business evolved or grown supporting the Orion program?

MTM has expanded the depth and breadth of our manufacturing capabilities and has developed core competencies that will increase our value as a key supplier to the Orion program.

Capital equipment investments in additional five-axis and high-velocity machining centers are directly attributable to MTM's support of the Orion program.

Human capital investments in engineering, quality assurance, and skilled labor personnel to support the Orion program have been significant and are ongoing.

Describe future endeavors for your small business with NASA and/or the Federal Government.

The capabilities and competencies applied throughout our engagement with the Ares 1-X and Orion programs are transferable to future aerospace and aeronautics programs.

MTM ownership, management, and employees strongly believe in and support space, science, and defense programs.

MTM is a proven leader in the manufacture of precision hardware for aerospace and defense applications.

MTM manufactures mission-critical hardware for both public and private customers, supporting land, naval, air, and space programs.

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Mathematical Research, Inc., dba MRI Technologies

Small Disadvantaged Business, Woman-Owned Small Business

Tell us about your company's history and capabilities.

MRI Technologies is an established woman-owned small business that has been operating since 1988. The company's heritage is in information systems, engineering, project management, and flight planning and integration. Our competencies are engineering, analysis, test, and evaluation; flight hardware management, logistics, and integration; property management; flight/increment management; construction quality inspection and ISO compliance; configuration and data management; resource management; program and project services including process improvement; and information technology and IT security. We have permanent presences in Texas and Colorado; and flexible support in Alabama, California, Connecticut, Florida, Indiana, Louisiana, Maryland, Michigan, Mississippi, Utah, and Virginia. Our customers include the Department of Defense, Jacobs, Lockheed Martin, NASA Johnson Space Center, PAE Applied Technologies, Raytheon, United Space Alliance, and UTC Aerospace Systems.

How many employees does your company have?

MRI currently has 107 employees who hold graduate, undergraduate, and associates degrees, as well as technical training in their areas of expertise.

How long have you supported the Orion program?

MRI has supported the Orion program since the contract award to Lockheed Martin in 2006. We started with test and verification support, and, based upon our performance, have won task orders in engineering; program management; and electrical, electronic, and electromechanical parts.

Describe what services or support you provided to the NASA Orion program.

Engineering, analysis, test, and evaluation: MRI provides testing, validation, and verification for complex hardware and software systems and subsystems. We provide engineering analysis of flight and test components, structural systems, stress analysis, models, and we generate engineering drawings and parts lists.

Configuration Data Management (CDM): MRI provides CDM expertise supporting the Engineering Change Manager in the management and integration of NASA change requests. This support includes managing change activities using Windchill.

Project and Process Management: MRI provides support for technical reviews. We support the Chief Engineer in the Orion Process Implementation and the CMMI Level 3 Certification efforts.

Information Technology: MRI uses C/C++ and Rhapsody primarily to develop EGSE Command and Status and EGSE Telemetry software CSCIs.

How has your business evolved or grown supporting the Orion Program?

MRI's engineering, program management, and critical software development expertise has evolved and grown as a direct result of support to the Orion program. MRI was recognized by Lockheed Martin with the prestigious Rigel Small Business of the Year award in 2011. Leveraging our Orion experience, MRI earned a spot as a team member on a 9-year engineering support contract which began in 2013. MRI led a team on a bid for an engineering support contract, citing our Orion experience and performance. We have

developed expertise with Windchill, adding to our capability to support CM/DM of large programs. MRI has also developed NASTRAN expertise for propulsion systems models along with guidance, navigation, and control software expertise.

Describe future endeavors for your small business with NASA and/or the Federal Government.

It is an exciting time for MRI; we are growing our engineering services business and have strategic bids on large contracts supporting NASA. MRI has targeted business diversification and bids in process to the U.S. Navy. We have invested in extending our capabilities to the energy sector through education, partnering with universities, and attending trade shows. MRI has the Orion contract and other contracts in the NASA sector, as well as pending awards for contracts ranging in duration from 5 to 10 years. These wins would add to the considerable expertise MRI now has supporting engineering programs. MRI is progressing towards AS9100 certification.

MRI CEO Debbie Kropp (center) and Lockheed Martin's Cleon Lacefield (left) and Michelle Butzke (right) stand with the Lockheed Martin Rigel Small Business of the Year Award.

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Models & Tools, Inc.

Small Business

Tell us about your company's history and capabilities.

Our company was founded in 1974 as a modeling and fixture shop for the automotive industry. To diversify, ownership expanded to the aerospace industry in the early 1980s. Currently, our business is exclusively dedicated to the aerospace industry in the defense, space, and commercial sectors. Our capabilities range from small tooling fixtures and lay-up mandrels to turnkey assembly stations. We can support the industry's current demands for high-tolerance tooling in design, laser tracking, large 5-axis machining, and installation.

How many employees does your company have?

Models & Tools currently has 169 total employees composed of 5 program managers, 16 designers/programmers, 12 laser tracker operators, 119 manufacturing technicians, and 17 general and administrative support staff.

How long have you supported the Orion program?

We have supported the Orion program since 2008.

Describe what services or support you provided to the NASA Orion program.

Our company provides solutions for complex tooling utilized to manufacture the crew module for the Orion project during the friction stir-welding phase. The tooling created a challenge for both teams because of the critical location of the weld and the limited space available to meet the requirements.

How has your business evolved or grown supporting the Orion program?

Since our move to our current facility in 2009, and with the addition of large 5-axis machining capabilities, we are able to support larger tools to meet customer demands.

Describe future endeavors for your small business with NASA and/or the Federal Government.

Currently, we are working on another configuration for the friction stir welding process on another critical weld location. Our tooling will be utilized to complete the last step in the welding phase and is extremely critical to the program. In addition, for the Federal Government we have contracts to provide all master tooling for the weapons bay doors, main landing gear doors, and canopy for the F-35 program.

Laser tracker inspection of a bump form weldment for rework of T87C5515 CM FWD weld assembly.

Assembly of rework for T87C5515 CM FWD weld assembly.

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Odyssey Space Research, LLC

Woman-Owned Small Business

Tell us about your company's history and capabilities.

Established in 2003, Odyssey Space Research, LLC, is an award-winning, innovative aerospace engineering, development, analysis, and research services company based in Houston, TX, near the NASA Johnson Space Center. We are a woman-owned small business providing advanced engineering services in the core domain of Guidance, Navigation, and Control (GNC) design, research and analysis, simulation, flight software, ground software, integration, evaluation, testing, and project management. Our passion and focus is on human space flight, and we are privileged to have received the highest recognition for outstanding quality work, creative solutions to challenging problems, innovative approaches, and unmatched customer value.

How many employees does your company have?

Odyssey's team currently stands at 60 employees; more than half of them have advanced technical degrees.

How long have you supported the Orion program?

Odyssey started its journey with the Orion program in 2006 as part of the NASA and Lockheed Martin team. Odyssey supported the Orion vehicle and mission design for the Constellation program, Pad Abort-1 (PA-1) test flight, Exploration Flight Test-1 (EFT-1) mission, and is currently supporting the design and development of the spacecraft for the Exploration Missions 1 and 2 (EM1 and EM2).

Describe what services or support you provided to the NASA Orion program.

Odyssey's original scope for the Orion program focused on GNC, mission design, and vehicle simulation. As the Orion program evolved, Odyssey's role on the Orion team expanded to include engineering design, development and testing in GNC, additional simulation, flight software and flight software test bed development, mission architecture, and vehicle systems engineering. In 2010, Odyssey won the Rigel Award, Lockheed Martin's Orion Small Business of the Year Award. Odyssey is proud to have fulfilled important roles in the successful test flights to date and is excited to further our relationships and support for the upcoming missions.

How has your business evolved or grown supporting the Orion program?

The Orion program has allowed Odyssey to grow and extend its breadth and depth of experience on spacecraft design and development in both our core areas and adjacent areas of technical expertise. We've extended our GNC role to include missions beyond low-Earth orbit, increased our participation in entry, descent, and landing flight systems and phases, and reinforced our on-orbit GNC skills. During Odyssey's 8 years on the Orion team, approximately 50 percent (>50 people) of our personnel have directly supported the program, significantly expanding the scope, skills, and range of our personnel in the flight software development and test domain. We've also gained experience with additional simulation and software capabilities and tools and augmented our capacity for building hardware-in-loop test beds.

Describe future endeavors for your small business with NASA and/or the Federal Government.

Odyssey is looking forward to being part of Orion and the EM1 and EM2 teams and the exciting exploration mission opportunities to come. Odyssey hopes to leverage our experience with Orion, the Commercial Crew and Cargo vehicle programs, and the International Space Station Visiting Vehicle programs and play a leading role in human space flight for NASA and the commercial space flight community. We will continue our research and development of new spacecraft technologies and innovations and apply these technologies, associated skills, and tools to the advancement of future space flight–related areas.

Odyssey supports several laboratories, providing key hardware-in-the-loop test bed buildup and analyses support to the Orion program.

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PaR Systems, Inc.

Small Business

The 12-axis polar x-ray machine, built and installed by PaR Systems.

Tell us about your company's history and capabilities.

Since 1961, PaR Systems has provided intelligent material handling, automation, and robotic solutions that drive quality, productivity, and safety in manufacturing and other demanding environments. PaR designs and builds large-scale and small precision systems used in many industries, including aerospace, marine/defense, nuclear/hazardous materials, industrial, food and beverage, and life sciences.

Our capabilities include automated assembly, drilling, routing, milling, cutting, nondestructive testing (NDT) services, coating application, and coating removal. PaR integrates precision motion machines with production-proven process equipment. Custom turnkey systems allow customers to define their specific requirements.

PaR's precision machines include standard XR and Vector gantry robots, LM series high-precision motion platform, custom robotics, telerobotic manipulators, and a line of modular robots. Large assembly areas and high-bay spaces allow for full integration and system development prior to shipment.

How many employees does your company have?

PaR currently has 400 employees.

How long have you supported the Orion program?

PaR supported the Orion program from June 2013 to January 2014.

Describe what services or support you provided to the NASA Orion program.

PaR's NDT Services completed the final subsystem close-out tube weld x-rays on the Orion Capsule and Service Module being built by Lockheed Martin Space Systems at the Kennedy Space Center in Florida. NDT Services performed third-shift x-ray evaluations of all Propulsion and Environmental Control and Life Support Systems welds in the Operations and Checkout Building at KSC from June of 2013 through January of 2014. During this time, NDT Services x-rayed over 500 production welds and 200 weld process samples. NDT Services personnel also support Lockheed Martin supplier Textron in Wilmington, MA, in the evaluation of the AVCOAT Heat Shield, which was completed and delivered to KSC in January 2014 for integration to the flight test vehicle. PaR's NDT Services is continuing this effort in a follow-on study with NASA that will hopefully lead to future approval of digital x-ray inspection, as opposed to the conventional film x-ray inspection that was used for EFT-1.

How has your business evolved or grown supporting the Orion program?

PaR Systems has evolved from the Orion project because we were able to support other NASA groups at Langley, JPL, and KSC with our advanced NDT Services testing and process development capabilities. NDT Services has introduced opportunities to increase sales of NDT equipment such as the Backscatter (BsX) and Laser Ultrasonics LaserUT.

Describe future endeavors for your small business with NASA and/or the Federal Government.

PaR's NDT Services is continuing to work with NASA on a digital radiography assessment specifically geared to inspect orbital arc tube welds. This study is the start of a long process that will hopefully lead to future approval and use of digital x-ray inspection on Orion hardware, as opposed to the conventional film x-ray inspection that was used for EFT-1.

PaR has also broadened to other departments of the Armed Forces, such as the Department of the Navy, funded by the Office of Naval Research, executed and managed by Naval Sea Systems.

The 12-axis polar x-ray machine, built and installed by PaR Systems.

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Paragon Space Development Corporation

Woman-Owned Small Business

Composite radiator panels, with ducting and plumbing, major Orion subsystem interfaces, element interfaces as well as the overall Orion schematic and passive/active thermal control analysis.

Tell us about your company's history and capabilities.

Paragon was founded in 1993 and has since become the premier provider of environmental control systems for extreme and hazardous environments. We design, build, test, and operate life-support solutions and leading thermal control products for astronauts, contaminated water divers, miners, and other extreme environment explorers, as well as for crewless space and terrestrial applications. Paragon is AS9100 Rev. C certified.

Paragon's capabilities include: Environmental Control and Life Support System (ECLSS) products, analysis, and design; and thermal control products, analysis, and design.

Our services include: aerospace tubing design, routing, and manufacturing; engineering—ECLSS, thermal, computational fluid dynamics (CFD), systems engineering, human factors; applied research and development; manufacturing; and environmental control system testing.

How many employees does your company have?

Currently, Paragon has 47 employees in three locations: Arizona, Colorado, and Texas.

How long have you supported the Orion program?

Paragon has been supporting the Orion program since January 1, 2004, with a NASA SBIR Phase I titled "Integral Radiators for Next Generation Thermal Control Systems."

Describe what services or support you provided to the NASA Orion program.

For more than a decade, Paragon has been contracted by Lockheed Martin in support of the Orion program. The scope of the contract has included the development of radiator panels, ECLSS ducting and plumbing for the crew and service modules, management of the overall Orion vehicle schematic and passive / active thermal control analysis (ACTS). Paragon has performed trade studies for a two-loop ATCS system to redesign the active thermal control system where 10 different options had been identified for evaluation; Paragon was assigned ownership of three of these options including stagnating radiators, controlled bypass radiators, and deployable radiators. Furthermore, in 2013, an overall ECLSS non-advocate architecture review was supported.

Currently, Paragon is contracted to produce a second Flow Measurement Subassembly (FLO1) flight unit (S/N 002) for utilization on the EM-1 flight and to support development and documentation of analytical models for DRD CEV-T-064000, passive thermal control mathematical models and documentation.

How has your business evolved or grown supporting the Orion program?

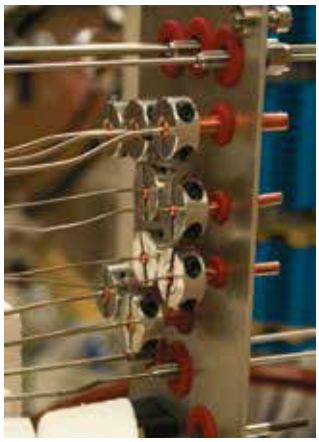
Paragon's work with design, analysis, routing, manufacturing, testing, and delivery of the pressurized and unpressurized ECLSS tubing for the EFT-1 flight vehicle was a monumental milestone. This work produced the largest set of flight hardware that Paragon has built to date and a deliverable that was provided to highest tolerances, on time, and within budget.

The FLO1, which was utilized on the EFT-1 flight in December 2014, was built and designed as a proto-flight contract end item

specifically designed for use in this flight test. FLO1's primary functions were to measure the flow rate, pressure, and temperature of the propylene glycol and water fluid in both spacecraft ATCS fluid lines. In addition, it was to measure the cabin air pressure and simulate the mass of hardware destined for future Orion spacecraft beyond EFT-1. Paragon is excited to see the results of this work.

Describe future endeavors for your small business with NASA and/or the Federal Government.

Paragon will continue to design, test, and manufacture critical life-support systems as well as update vital processes for sustainability in extreme environments while supporting the future goals of NASA and the Federal Government.



Left: Metabolic Heat Regenerated Temperature Swing Adsorption for CO2, Thermal, and Humidity Control.

Right: Solid oxide electrolysis for oxygen production in an Air Revitalization System (ARS).

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Precision Fabricating & Cleaning Co., Inc.

Small Business

Working in the panel assembly cleanroom.

Tell us about your company's history and capabilities.

The Precision Companies include Precision Fabricating & Cleaning Co., Inc. (PFC), Precision Mechanical, Inc. (PMI), and Precision Enterprises, Inc. (PEI)—separate, but complementary, business units. Precision's ISO 9001– and AS9100–registered facilities are located on 12 acres of industrial properties in Florida's Space Coast.

Established in 1964, PFC offers fabrication, chemical pretreatment, precision cleaning, testing, and painting services to our customers. PMI has been offering mechanical services to a wide array of Government, industrial, commercial, and institutional customers since 1986. PMI installs process piping, plumbing, and HVAC systems. PEI is an authorized sales and service agent for heavy-duty, large-scale transporters in North America.

All three small businesses have actively supported NASA's space program since they were founded.

How many employees does your company have?

PFC currently employs 95 dedicated full-time employees. This includes managers, engineers, support staff, and specialized craft personnel. Precision has a low turnover rate with employees uniquely qualified to meet the needs of the space program as well as the commercial industries we support.

How long have you supported the Orion program?

PFC has been supporting the Orion program since its inception. In 2008, NASA selected PFC as one of the few contractors qualified for the indefinite delivery, indefinite quantity mechanical and fluid ground support equipment contract. PFC has completed numerous Orion projects under this contract and under other types of purchase orders during all phases of the program.

Describe what services or support you provided to the NASA Orion program.

PFC has performed a myriad of support services for the Orion program. These include the refurbishment of existing NASA hardware, ground support equipment, and launch facilities to meet Orion configuration requirements; the fabrication of complex commodity panels and skid systems to supply the Orion spacecraft and facility; the precision cleaning of components and systems to stringent Kennedy Space Center specifications; the fabrication, cleaning, and installation of complex tubing and piping systems; and the fabrication of unique customized ground support equipment such as tooling, mockups, and work stands. Each of these PFC fabrication, testing, and installation projects in support of the Orion program includes strict quality control, close interface and design troubleshooting with NASA personnel, extensive acceptance testing, and thorough project documentation.

How has your business evolved or grown supporting the Orion program?

Although PFC has been a NASA support contractor since the 1960s, we have developed innovative technologies, created approved procedures, installed new equipment, and trained our technicians to meet the needs of each new program.

Specifically in support of Orion, PFC has become certified by Lockheed Martin as one of a small number of local providers of precision cleaning to specification MAP-211025. This cleanliness verification standard is a requirement for the precision-cleaned hardware required by the Orion program.

Additionally, PFC has Occupational Safety and Health Administration–trained personnel with the skills to work with the unique and complex Orion hardware. This training includes fabrication of AL6XN tubing/piping, working in confined space, working at heights, creating detailed acceptance test procedures, integration of complex control systems, and installation of cryogenic systems.

Describe future endeavors for your small business with NASA and/or the Federal Government.

Precision will continue supporting NASA in a variety of upcoming projects. For the Orion program, we are currently working on two major retrofit projects at Launch Pad 39B and are also working on a proposal for mobile launcher modifications. Precision is also fully integrated in supporting NASA and the International Space Station through our engineering and precision cleaning efforts at Wallops Island launch operations.

As a qualified and approved subcontractor to NASA and Federal Government contractors such as United Launch Alliance, SpaceX, and Lockheed Martin, and as a prime NASA contractor, we will continue to provide fabrication, cleaning, testing, and installation services for new projects as they are developed. Because Precision also has a strong commercial project base, we are uniquely positioned to continue growing, improving, and supporting Government projects as they fluctuate during development phases.

The auxiliary skid.

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Rayotek Scientific, Inc.

Small Disadvantaged Business

A prepolished forward pane with finished hatch pane being scanned on laser microscanner.

Tell us about your company's history and capabilities.

Rayotek was founded in 1992 in San Diego, CA, by Bill Raggio as a glassblowing company for the local biotech industry. Having "grown up" in the scientific and engineering communities of the University of California, San Diego, and General Atomics as both an engineer and a physicist, Bill modeled the basic business structure after these respected organizations. Since its inception, Rayotek has evolved into an engineering and a manufacturing company with customers in over 35 countries.

Rayotek has evolved by customer demand into a high-tech, ISO 9001 Engineering and Manufacturing company. Our manufacturing capability supports high-tech processes in sealing, ultra-high pressure and vacuum windows and assemblies, glass and sapphire medical components, and aerospace/marine/submarine windows and sight windows.

Our engineering team has extensive experience in mechanical, industrial, structural, aerospace, and ultra-high-pressure systems, from micro to massive. As our motto says, we are "The Clear Solution."

How many employees does your company have?

Our staff of 27 is presently made up of 10 engineers, a QA engineer/manager, a master optician, a physicist, and our technical and administrative support team.

How long have you supported the Orion program?

Four years ago (March 2011), Michelle Butzke, Lockheed Martin's Small Business Advocate, discovered us and referred us to the Orion team.

Describe what services or support you provided to the NASA Orion program.

As noted, Rayotek is a high-tech glass and sapphire engineering and manufacturing company. Rayotek came to the "Orion table" with a deep understanding of how to make windows for rigorous environments. Rayotek currently makes windows that can take pressures of up to 60,000 psi and temperatures of up to 2,000 °C and can resist pretty much every chemical known. In addition, we know how to strengthen and support the windows so that even in the event of a malfunction, the results are not catastrophic. Not only has Rayotek used its IP to make the Orion windowpanes stronger than previously made windowpanes, but its engineering staff has also developed a laser scanning system that can detect, map, and clearly image microscratches and defects on the surface and in the bulk of the windows. Finally, Rayotek engineered and built a proof pressure system that accurately matches finite element modeling at NASA to accurately test the strength and reliability of Orion windowpanes.

How has your business evolved or grown supporting the Orion program?

The Orion program was a big program (big shoes) to step into for a company of Rayotek's size. The last company to fill these shoes was Corning, Inc., a highly respected 150-year-old company with 30 years of experience with the Space Shuttle Program.

Rayotek had to learn fast how to navigate the complex business and engineering culture of NASA, where a "great idea" is not enough to convince a myriad of skilled engineers, scientists, and administrators that it's worthy of going on a manned spacecraft. We didn't know what "DCMA" (Defense Contract Management Agency) was before Orion!

With incredible patience and guidance from the NASA and LMCO Orion team, Rayotek has learned a lot, doubled our staff, gained confidence, and established a reputation of being the best when it comes to safe, reliable spacecraft (and other vehicle) windows.

Describe future endeavors for your small business with NASA and/or the Federal Government.

Rayotek has been working with NASA and other Government agencies for many years, but never at the level of the Orion program. Now, that has changed.

Rayotek is the sole manufacturer of AINS lenses for the B2 program, the supplier for all windowpanes for the Boeing Commercial Crew Transportation Capability (CCtCAP) program (both fused silica glass and acrylic), and the producer of a variety of high-pressure sight windows for all sectors of Government and commercial aerospace applications.

Rayotek's most dramatic endeavor to date will be building a 2.3-meter-diameter glass sphere for human occupancy submersibles designed to go FOD (full ocean depth). In order to do this, Rayotek will fabricate the world's largest glass sphere to extremely tight tolerances and will build the world's largest ultra-high-pressure test system at over 3 meters in diameter—theoretically able to withstand a test pressure of 25,000 psi.

Precision diamond grinding a massive 3-meter ceramic block into a lithography base.

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Red Canyon Software, Inc.

Veteran-Owned Small Business, Historically Underutilized Business Zone Concern

Tell us about your company's history and capabilities.

Red Canyon Software, Inc. (Red Canyon), formed in 2000, is a Veteran-Owned, Historically Underutilized Business Zone–Certified, and U.S. Small Business Administration–Certified Small Business. We are passionate about "Exploring Other Planets, Improving Our Own." Red Canyon develops cutting-edge technology to help humankind explore space and other planets, as well as advance renewable resources on Earth. We are proud to be involved with important missions that range from searching for water on Mars, to analyzing the composition of distant comets, to building the next human spacecraft. Our clients include Government agencies such as NASA, the Department of Defense, the National Oceanic and Atmospheric Administration, and the National Renewable Energy Lab (NREL), in addition to prime contractors such as Lockheed Martin, Exelis, Millennium Engineering & Integration Company, Honeywell, United Launch Alliance, SAIC, Ball Aerospace, and SEAKR Engineering.

How many employees does your company have?

Red Canyon currently has 75 employees. We work on the Orion program as a tier-two subcontractor through various NASA primes like Lockheed Martin Space Systems and Honeywell. During the last 9 years, we have had 49 engineers on over 37 task orders supporting Orion. These engineers have been on assignment for Orion across the country in the following states: Colorado, California, Florida, Texas, New Mexico, Louisiana, and Arizona.

How long have you supported the Orion program?

Red Canyon began service on Orion through Lockheed in 2006 during the proposal phase. We were excited when we beat the Boeing team! When Lockheed decided to move Orion to an indefinite delivery, indefinite quantity (IDIQ) format in 2007, we received our first IDIQ award! In 2010, we were awarded a follow-on 3-year contract. In 2014, Red Canyon won our 5-year Lockheed Civil Space IDIQ contract under which we support the Orion program. We look forward to continuing to support the program post-EM-1.

Describe what services or support you provided to the NASA Orion program.

Red Canyon first supported Lockheed with systems engineering and trade studies during the proposal phase in 2006. In 2007, we brought on engineers to conduct mechanical design and stress analysis. In 2008, we hired FPGA design, verification, and validation engineers; electrical engineers to design and test the power and data card; and software engineers for software development. In 2009, we brought on systems engineers to help design the PA-1 test as well as conduct operations on site at WSMR and electrical engineers to design EGSE for PA-1 and EFT-1. In 2010, we added senior systems engineers to support Roger McNamara's tracking of program metrics, financial analysts to help keep the program on budget, and systems safety engineers to conduct range safety. We've continued with similar support through Lockheed to date.

How has your business evolved or grown supporting the Orion program?

Orion was the most pivotal program in Red Canyon's history. It truly elevated us from a micro company that had between 10 and 18 employees from 2000 to 2006, to a company that now has 75 employees in 7 different states working on 10 different contracts. We have won prime contracts with NASA Glenn, NASA Ames, AFRL, and NREL. Since winning our first IDIQ on Orion with Lockheed, we have won four additional IDIQ contracts, including KLXS-II at KSC and a prime IDIQ contract with NREL. We

are also supporting Orion at Honeywell in Arizona and on the GSDO program at KSC. We have begun to conduct research and development through the NASA and USAF SBIR programs. We have undergone two DCAA audits and passed with flying colors!

Describe future endeavors for your small business with NASA and/or the Federal Government.

Red Canyon's future is electrifying! We are performing on a Phase II SBIR with NASA Ames and the Jet Propulsion Laboratory (JPL) to develop autonomous flight software for upcoming NASA robotic and human missions. In fact, we are currently pursuing a Phase III with JPL to fly this software on one of their upcoming missions. We also just submitted another SBIR proposal to NASA to pursue combining this autonomous flight software with NASA Goddard's open-source core flight software (cFE/CFS). By adding tools that enhance the CFS product, more complex missions will be able to use CFS as a baseline. Ultimately, this will decrease the cost of developing spacecraft and help entrepreneurs (like us!) start to commercialize and make money in space.

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Red Canyon employee, Lisa Akers, inspecting Orion hardware at KSC.

Red Canyon employee, Milt Heflin, recovering Orion.

San Diego Composites

Small Business

Tell us about your company's history and capabilities.

San Diego Composites, Inc. (SDC), is an employee-owned company with a staff that is committed to providing high-quality materials and structures technology, product development, and testing and production services to the aerospace and defense community. SDC initially built its reputation upon research and engineering, and each year since its inception in 2003 has added expert staff and equipment. SDC offers engineering capability that includes design, analysis, fabrication, and test. This makes SDC unique in the composites community, given that most composites companies focus on fabrication.

How many employees does your company have?

SDC currently has 45 employees.

How long have you supported the Orion program?

SDC began working with the Orion program in 2009 when the Ground Test Assembly (GTA) build was coming into form.

Describe what services or support you provided to the NASA Orion program.

SDC was a key member of the GTA team and had produced over 1,000 pieces/parts that flew on the Exploration Flight Test-1 (EFT-1) build. Our most significant hardware was the Launch Abort System (LAS) fillet. Additionally, SDC has helped develop processes and fabricated hardware encompassing everything from the LAS acoustic blankets, to the Crew Exploration Vehicle acrylic windows, to the backshell drilling templates.

How has your business evolved or grown supporting the Orion program?

Since 2009, when SDC began to support Orion, SDC has grown from 20 employees and $5 million in annual sales to 45 employees and $10 million in annual sales. SDC's accomplishments with the Orion program are a significant element of that growth.

Describe future endeavors for your small business with NASA and/or the Federal Government.

SDC continues to support Orion and NASA as the program heads to EM-1. We are currently supporting key technology development efforts with both NASA's Ames Research Center and Lockheed Martin on the 3D Mat project. 3D Mat will be a material replacement for the Orion compression pads for EM-1 and beyond.

SDC is also now in the throes of contract negotiations for the EM-1 fabrication efforts on multiple critical structural components. SDC's future as a partner for both NASA and the Orion program is bright!

LAS Fillet Fabrication at SDC.

Acoustic Blanket Fabrication at SDC.

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SEAKR Engineering, Inc.

Small Business

Tell us about your company's history and capabilities.

SEAKR Engineering is a world-leading provider of advanced state-of-the-art electronic systems for space and airborne applications. Since the company's first contract in 1983, SEAKR has won, developed, and delivered many spacecraft electronics subsystems. Over 110 units have been launched and performed, or are currently performing properly. To date, SEAKR has never had an on-orbit failure. This 100 percent success rate has helped establish SEAKR as one of the world's leading suppliers of advanced, state-of-the-art spacecraft electronics, including layer III IP routers and modems, software-defined radios, high-performance payload processors, modular command and data handling systems, and solid-state recorders. SEAKR is a U.S. business proud to serve its customers and country.

How many employees does your company have?

At the end of 2014, SEAKR employed 421 individuals and another 46 contractors. However, those numbers are growing weekly. SEAKR employees average 16 years of industry experience and 6 years of employment at SEAKR, with over 70 percent holding a bachelor's degree or higher. Over 55 percent of SEAKR's full-time staff members have a technical degree.

How long have you supported the Orion program?

SEAKR has been a part of the Orion team since Lockheed Martin's proposal back in 2006. In 2008, SEAKR won the contract for the Vision Processing Unit (VPU). The scope of SEAKR's involvement in the Orion program has grown since that time and even influenced the architecture of future missions.

Describe what services or support you provided to the NASA Orion program.

SEAKR provides the VPU for the Orion program. The VPU processes video captured by five cameras on board the spacecraft. These data assist in the docking and rendezvous procedures for the Orion capsule. The media files from the cameras can be stored and/or transmitted to Earth by the VPU, allowing for live feeds from the Orion spacecraft. The VPU will also be providing backup flight computer functions to the spacecraft. SEAKR is currently in the process of adding more memory to the VPU to increase its capabilities even further. All video from the spacecraft during the Orion Exploration Flight Test-1 (broadcast to viewers on NASA TV) ran through SEAKR's VPU.

How has your business evolved or grown supporting the Orion program?

SEAKR originally won its place on the Orion program with the VPU. However, SEAKR pioneered a way for the VPU system to double as the backup flight computer. This saved size, weight, and power, and the innovation is now standard for future missions. Given the novelty and advancement in capabilities, the VPU was a very challenging system development. SEAKR's success in executing the build helped fuel the company to a 15 percent annual growth rate. SEAKR's Orion VPU work has also helped with programs that are seeking an established company with experience in high-performance FPGA systems. Following the development phase of the VPU, SEAKR upgraded its test and manufacturing facilities, giving the company even more enviable, full-product, life-cycle capabilities.

Describe future endeavors for your small business with NASA and/or the Federal Government.

The Orion VPU established the foundation for several collaborative SEAKR efforts with NASA, the National Oceanic and Atmospheric Administration, and the Department of Defense, chief of which is the NASA Laser Communication Relay Demonstration (LCRD) that is utilizing a SEAKR-built qualified laser communications switch—technology that wasn't even possible 10 years ago. SBIRs have been an integral part of SEAKR's innovative capabilities. Through a NASA-funded SBIR, SEAKR built upon the experience gained from the VPU technology to develop a small form factor, high-performance, integrated processing memory system that will provide a step function capability in capacity and performance for space-qualified memory and processing systems. SEAKR currently has other Government projects building data records/avionics, including JWST, ICESAT-2, and JPSS.

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Systima Technologies, Inc.

Small Business

Tell us about your company's history and capabilities.

Systima Technologies, Inc., founded in 2000, is a premier manufacturer of fully qualified energetic and ordnance systems supporting the aerospace, defense, space, and commercial markets. Systima has two facilities in Washington located in Kirkland and Bothell. The Kirkland location just opened in 2014, and it is where engineering, development, energetic testing, and production occur. The Bothell location operates our Environmental Test Lab (ETL), supporting both Systima products and a growing aerospace customer base. Systima provides engineering services, research and development, and production of deployment systems including parachute mortars, launch canisters, pyrotechnic actuators, missile and launch vehicle stage separation, panel deployment, and shroud systems. Our customers include NASA, the Air Force, the Army, the Navy, SOCOM, Boeing, Raytheon, Lockheed Martin, L3, and many more.

How many employees does your company have?

When we first started supporting the Orion program nearly 7 years ago, we had 10 full-time employees and less than 5 percent of our business was space-related. Today we have grown to 35 employees and nearly 20 percent of our business is space-related, in large part because of the opportunities that the Orion program has provided.

How long have you supported the Orion program?

Systima has supported the Orion program since 2007. Systima supported Orion as a subcontractor to Pioneer Aerospace to build the Forward Bay Cover (FBC) parachute mortar for Pad Abort-1 (PA-1). Systima built upon this experience and made our most significant contribution to Orion through the FBC thruster program, which started in 2011 and flew on Exploration Flight Test-1.

Describe what services or support you provided to the NASA Orion program.

Systima has provided engineering design, analysis, testing, and hardware fabrication services for development of the Orion FBC thruster, which retains the FBC during most of Orion's mission and then releases and ejects the FBC during descent. The FBC is a shroud that protects the parachute descent system until it is ready to be deployed. After reentry, at approximately 23,000 feet, the FBC thruster unlocks and jettisons the FBC. Systima conducted mechanical design, pyrotechnic gas generator performance analysis, detailed finite element analysis, and all development and qualification fabrication and testing of the thruster. As a subcontractor to Pioneer, Systima provided similar services including engineering design, analysis, testing, and production of the Orion Pad Abort-1 (PA-1) parachute mortar.

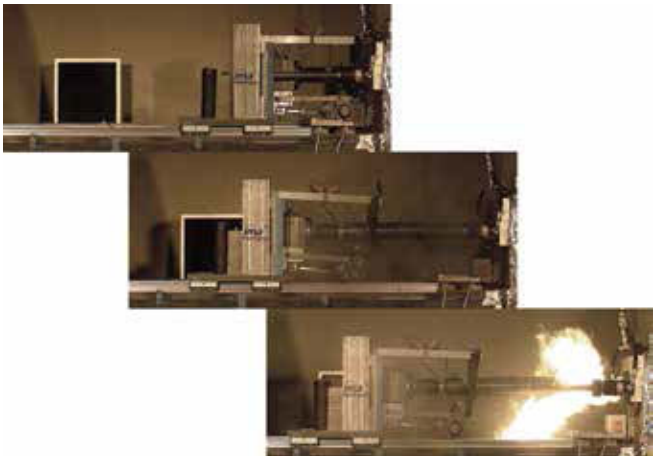
How has your business evolved or grown supporting the Orion program?

Since the first Orion subcontract and the development of the PA-1 FBC mortar, Systima has become a critical supplier of space flight pyrotechnic devices. Systima has produced the Orion FBC thruster, ballute mortars for JPL's Low-Density Supersonic Decelerator project, the OSIRIS-REx drogue parachute mortar, hot gas generators for orbital's launch vehicles, and pyrotechnic valves for United Launch Alliance (ULA). Each of these programs benefited from the first Orion program contract by establishing a broader production delivery background for Systima's product line, expanding from the large variety of products built in a low-

quantity R&D environment. Systima is continually improving its manufacturing and engineering processes and increasing its product line and customer base as a result of these programs.

Describe future endeavors for your small business with NASA and/or the Federal Government.

Systima is an active participant in the Small Business Innovation Research programs with NASA and the Department of Defense agencies. Systima has two patents (one joint with Raytheon) on stage separation and integral lock release ejectors. We are currently working with NASA on green monopropellant technologies including a microthruster injector and noncatalytic ignition of Hydroxylammonium nitrate (HAN)–based propellants. Systima is actively working with Boeing and the Defense Advanced Research Projects Agency (DARPA) on the Airborne Launch Assist Space Access (ALASA) program to provide the engineering design, analysis, test, and production of the payload shroud and deployment system as well as the stage ½ separation joint. Systima also expects to continue with qualification testing on the FBC thruster in support of Orion's EM-1 and future flights.



High-speed-video images of an FBC thruster test-firing at Systima's energetics test facility.

An Orion FBC thruster designed, built, and qualified by Systima Technologies.

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Teletronics Technology Corporation

Small Business

An Airborne Instrumentation Multiplexer with Built-in Solid-State Recorder.

Tell us about your company's history and capabilities.

Teletronics Technology Corporation (TTC), incorporated in 1998, provides solutions for instrumentation, telemetry, display and control, communications, recording, airborne high-speed imaging, and network-based data acquisition applications to the Aerospace markets. We offer a wide range of commercial off-the-shelf (COTS) hardware and software products for applications that require reliable, modular, programmable, miniaturized, high performance, and resilient products. TTC offers a range of products, including data acquisition systems (Pulse Code Modulation [PCM] based and networked), signal conditioners, data encoders, high-speed data multiplexers, solid-state and hard-drive data recorders, instrumentation power systems, fiber optic based avionics bus monitors, telemetry products, ground support products, avionics display and control units, and commercial equipment. Many of these solutions are available in miniaturized versions for space-limited applications, and highly ruggedized and sealed packaging options are also available.

How many employees does your company have?

TTC presently has 220 employees.

How long have you supported the Orion program?

TTC has supported the Orion program since 2007 with data acquisition units (DAUs) to NASA's Dryden Flight Research Center (now named Armstrong [AFRC]). In 2008 we supported Lockheed Martin Orion with our PCM DAUs and Multiplexer (MUX) recorders. In 2011 we continued support to Johnson Space Center (JSC) and AFRC as well as Lockheed Martin (LM) for development flight instrumentation (DFI) for Exploration Flight Test-1 (EFT-1).

We are presently supporting LM in development of the Exploration Mission (EM-1) DFI as well as NASA Glenn Research Center (GRC) for the Space Launch System (SLS) DFI.

Describe what services or support you provided to the NASA Orion program.

We have been providing DFI in support of Orion since 2007. We have worked with NASA and LM in designing the instrumentation systems required to capture the developmental flight measurements using our configurable COTS signal conditioning systems. For the recent EFT-1 flight, TTC Miniature Wideband Data Acquisition Units (MnWDAUs) captured 1,200 data channels during the 4½ hour flight. This data was recorded real time in our MUX-3003 with built-in solid state recorders for post-flight review and analysis. Five of our 48-channel high-speed thermocouple conditioners/multiplexers (MRTM-4048C) were also flown to capture thermal data during the EFT-1 flight. We are currently redesigning the power supplies for our Miniature Network DAUs as well as our Network 8-Port Switch to make them radiation-tolerant for use on the EM-1 flight.

How has your business evolved or grown supporting the Orion program?

Since providing initial support to Orion in 2007, TTC has continued to grow our space business to where it represents approximately 10 percent of our sales each year. As our hardware continues to undergo space-level environmental testing and accumulate space flight heritage, we have continued to improve our COTS processes and procedures. We have also implemented additional methods for ruggedizing our products, which has opened new doors as we continue to grow our space flight business sector.

Our Radio Frequency Systems Group continues to develop and qualify transmitters, transponders, and Flight Termination Systems (FTS) in support of the booster and missile markets.

Describe future endeavors for your small business with NASA and/or the Federal Government.

TTC is now developing the hardware that will fly on Orion for EM-1 and possibly EM-2. This system will include our network-based DAUs that will have radiation-hardened power supplies developed by TTC. We anticipate the EM-1 flight hardware order in the near future.

In addition, we are currently building the Space Launch System Developmental Flight Instrumentation (SLS DFI) for the EM-1 flight. This hardware will support the NASA labs (engineering development units) as well as provide the DFI DAUs for the core section of the SLS. We anticipate receiving the new specification for the booster DAUs in the near future.

Left: A 48-Channel High-Speed Thermocouple Conditioner/Multiplexer.
Right: A 20 Mbps Miniature Wide-Band Data Acquisition Unit.

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Titusville Tool and Engineering Co., Inc.

Woman-Owned Small Business

Milling a ring segment.

Tell us about your company's history and capabilities.

Titusville Tool and Engineering was founded in 1974 at its present location in Titusville, FL. The mainstay of our workload is CNC milling, turning, and bending, but we have manual equipment to support the automated processes including milling, turning, grinding, honing, shearing, sawing, welding, and assembly. We are AS9100C-certified and registered. We are a woman-owned small business, and our president is hands-on involved with daily operations from documentation to manufacturing to shipping.

How many employees does your company have?

We are a true mom-and-pop business. All three employees are family and stockholders. We are cross-trained on multiple operations, but each of us has our own strengths and skillset. The keys to our customer satisfaction are the independent skills and interdependent workflow that result from this consanguinity.

How long have you supported the Orion program?

We have supported the Orion program since autumn 2012. The tone for our support of the program was set with an early Saturday morning call from NASA asking us to modify existing ground support hardware. They requested completion by that same afternoon to keep them on schedule.

Describe what services or support you provided to the NASA Orion program.

We have supported the Orion program with a wide range of machining services. Some of our work involved manufacturing drill or assembly fixtures to provide the Orion team with the proper alignment tools necessary for assembly of the space vehicle. Other tasks involved modification of cutting tools and alignment fixtures to meet the conditions that presented themselves in assembly. Often, these tasks would involve an abbreviated set of instructions to ensure that the work could be accomplished with very short notice and a quick turnaround. Over the years, we have worked very closely with Orion engineers to produce what they needed when they needed it.

How has your business evolved or grown supporting the Orion program?

We have evolved from solely manufacturing products to providing machining as a service. Several of the tasks we've worked on involved offering alternative solutions because of unavailable material or components. Design for manufacturing was developed in coordination with Orion engineers to meet time and cost goals.

Describe future endeavors for your small business with NASA and/or the Federal Government.

We are already on board with the Orion team for the next mission. We expect to see similar tasks to support the mission. We also hope to continue to foster our relationship with Orion engineers. The future may hold opportunities in nontraditional machining and rapid prototyping.

Modification of cutting tools.

Assembly fixtures.

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List of Supporting Small Businesses

TABLE KEY	
	Small businesses featured in this publication
★	Small Business Industry Awards—Agency Small Business Subcontractor of the Year
★	Small Business Industry Awards—Small Business Prime of the Year
★	Small Business Industry Awards—Small Business Industry Awards Subcontractor of the Year

COMPANY NAME	SOCIOECONOMIC CATEGORY
3SL, Inc.	Small Business
4 Star Electronics, Inc.	Veteran-Owned Small Business
A & A Machine Company	Small Business
A & A Manufacturing	Small Business
A & N Corp.	Small Business
A & R Tarpaulins, Inc.	Small Disadvantaged Business, Woman-Owned Small Business
A-B Computer Solutions, Inc.	Woman-Owned Small Business
A. B. Boyd Company	Small Business
A. E. Petsche Company, Inc.	Small Business
A. T. Parker	Small Business
Abrasive Technology, Inc.	Small Business
Accutech Instrumentation, Inc.	Small Business
Acme Machine and Welding, LLC	Veteran-Owned Small Business
Acopian Technical Company	Small Business
Acromag, Inc.	Small Business
ADC Engineering Technology, Inc.	Veteran-Owned Small Business
Adept Fasteners	Woman-Owned Small Business
ADH Communications	Woman-Owned Small Business
ADLINK Technology America, Inc.	Small Business
Advance Manufacturing	Small Business
Advanced Air Products Company	Small Business
Advanced Ceramics Manufacturing	Small Business
Advanced Circuits, Inc.	Small Business
Advanced Laser Cutting, Inc.	Small Business
Advanced Machine Stretchform Intl.	Small Business
Advanced Machining	Small Business
Advanced Solutions, Inc.	Small Business
Advanced Surface Technologies, Inc.	Small Business
Advanced Test Equipment	Small Business
Advanced Systems Group	Small Business
AECOM Services, Inc.	Small Business
AEM Holdings, Inc.	Small Business
Aero Bending Company	Small Business
Aero Pacific Corp.	Veteran-Owned Small Business
Aerocon Systems Company	Small Business
Aerofit, Inc.	Small Business
Aero-Missile Components	Small Business
Aerosoft, Inc.	Small Business

COMPANY NAME	SOCIOECONOMIC CATEGORY
Aerospace Engineering	Small Business
Agility Design Solutions, Inc.	Small Business
AGM Container Controls	Small Business
Airoborn Interconnect	Small Business
Airtech International, Inc.	Veteran-Owned Small Business
Al-Razaq Computing Services	Small Business
Alabama Aerospace Division	Small Business
Alcore, Inc.	Small Business
Aldec, Inc.	Small Business
Alejo Engineering, Inc.	Small Disadvantaged Business, Woman-Owned Small Business
Alexco, LLC	Small Business
All Business Machines, Inc.	Service-Disabled Veteran–Owned Small Business
All Points Logistics, LLC ★	Service-Disabled Veteran–Owned Small Business
All Tech Electronics	Small Disadvantaged Business
Allan Aircraft Supply Company	Small Business
Allcable	Small Business
Allen Tool Phoenix	Small Business
Allied Mechanical Products	Small Business
Allied Wire & Cable	Small Business
All-Spec Industries	Small Business
All Star Magnetics	Small Business
Allwire	Small Business
ALM Tech Group	Small Disadvantaged Business
Alpha Testing & Inspection	Woman-Owned Small Business
Alpine Fastener & Hardware	Small Business
Altima Technologies, Inc.	Woman-Owned Small Business
Aluminum Company of America	Small Business
Alvatek Electronics	Small Disadvantaged Business
Amamco Tool	Woman-Owned Small Business
Amawave, Inc.	Woman-Owned Small Business
American Aerospace Controls, Inc.	Woman-Owned Small Business
American Crane & Equipment Corp.	Small Business
American Drill Bushing Company	Woman-Owned Small Business
American Durafilm Control	Small Business
American Fiber and Finishing	Woman-Owned Small Business
American Future Technology Corp.	Small Business

List of Supporting Small Businesses (Continued)

COMPANY NAME	SOCIOECONOMIC CATEGORY
American Pacific Corp.	Small Business
American Reliance, Inc.	Small Business
American Seal & Packing	Small Business
American Synthetic Rubber Company	Small Business
Ametek Programmable Power, Inc.	Small Business
Amorim Cork Composites	Small Business
Amplifier Research	Small Business
AMRO Fabricating Corp.	Small Disadvantaged Business, Woman-Owned Small Business
Analog Systems, LLC	Veteran-Owned Small Business
Analytical Mechanics Associates ★★	Small Business
Analytical Solutions, Inc.	Small Business
Anixter, Inc.	Small Business
Anthro Corp.	Small Business
APCON, Inc.	Small Business
Apex Design Technology	Small Business
Apogee Labs, Inc.	Small Business
Applied Companies	Woman-Owned Small Business
Applied Composite Solutions	Small Business
Applied Image, Inc.	Small Business
Applied Ultrasonics	Small Business
A-P-T Research	Small Business
Arc Machines, Inc.	Small Business
Arcata Associates, Inc. ★★★★★	Small Disadvantaged Business, Asian Pacific American
Arde	Small Business
Area 51 ESG	Small Disadvantaged Business
Aremco Products, Inc.	Small Business
ARES Corp. ★	Small Business
Argosy Component Sales, Inc.	Small Business
Argus Systems, Inc.	Small Business
Arlington International Aviation	Woman-Owned Small Business
Arlon, Inc.	Small Business
Arnold D. Aldrich	Small Business
Arrowhead Products	Small Business
Art Metalcraft Plating Company, Inc.	Small Business
ASC International	Small Business
ASM Aerospace Specification Metals	Small Disadvantaged Business
Aspen Machining	Small Business
ASRC Federal Space and Defense	Small Disadvantaged Business
ASRC Research and Technology Solutions ★	Small Business, Alaskan Native Corporation
Associated Plating Company	Small Business

COMPANY NAME	SOCIOECONOMIC CATEGORY
Astrex Electronics	Small Business
Astro Space, Inc.	Veteran-Owned Small Business
Astro-Tek Industries, Inc.	Veteran-Owned Small Business
ATA Engineering, Inc. ★	Woman-Owned Small Business
Atcom Services	Woman-Owned Small Business
Atech Space Consulting	Small Disadvantaged Business
Atlantic Wire and Rigging	Woman-Owned Small Business
Aurora Bearing Company	Small Business
Avatar Machine	Small Disadvantaged Business
Aviatrix, Inc.	Woman-Owned Small Business
Aviel Electronics	Small Business
Avnet USI	Small Business
Av-Tech Industries	Small Business
Aydin Displays	Small Business
AZ Technology	Small Business
B & B Machine & Grinding Service	Small Business
B & B Electronics Manufacturing	Small Business
B & G Electronic Assembly	Small Business
Babcock and Wilcox	Small Business
Bally Ribbon Mills	Small Business
Barnhill Bolt Company, Inc.	Woman-Owned Small Business
Barry Avenue Plating Company	Small Business
Baum Precision Manufacturing	Small Business
Bay Cities Tool and Supply Company	Small Business
Bay State Computers	Small Business
BC Tool & Cutter Grinding	Woman-Owned Small Business
BCT Systems	Small Business
B/E Aerospace	Small Business
Benecor, Inc.	Small Business
Bergdahl Associates, Inc.	Woman-Owned Small Business
Bergen Cable Technologies	Veteran-Owned Small Business
Berkeley Telonic	Small Disadvantaged Business
Beyel Brothers	Small Business
Bisco Industries	Small Business
B.J.G. Electronics	Woman-Owned Small Business
Boggs Fire Equipment	Woman-Owned Small Business
Boxx Technologies	Small Business
Braswell Precision	Small Business
Brevard Canvas and Marine Interiors	Woman-Owned Small Business
Bron Tapes	Small Business
BTC Electronic Components, Inc.	Small Business
Buckles-Smith Electric Company	Small Business

COMPANY NAME	SOCIOECONOMIC CATEGORY
Byington Steel Treating	Woman-Owned Small Business
C & R Technologies, Inc.	Small Business
C. L. Hann Industries, Inc.	Small Business
Cablenet Wiring Products	Woman-Owned Small Business
Cableorganizer.com, Inc.	Woman-Owned Small Business
Cad/Cam Systems, LLC	Woman-Owned Small Business
Caddo Solutions	Small Business
California Metal & Supply	Small Business
California Quality Plastics, Inc.	Veteran-Owned Small Business
Capital Valve and Fitting Company	Small Business
Carahsoft Technology Corp.	Small Business
Carleton	Small Business
Carr Lane Manufacturing	Woman-Owned Small Business
Case Club	Small Business
CEI	Small Business
Celesco Transducer Products	Small Business
Celoxica, Inc.	Small Business
Certified Slings	Woman-Owned Small Business
Check Point Software Tech, Inc.	Small Business
Cima Solutions Group	Small Disadvantaged Business
Cimarron Software Services, Inc.	Woman-Owned Small Business
Ciphertechs, Inc.	Small Business
Circle W. Enterprises	Veteran-Owned Small Business
Circuit Express, Inc.	Small Business
Circuit Services, Inc.	Veteran-Owned Small Business
Cirrus Enterprises, LLC	Small Business
Click Bond, Inc.	Veteran-Owned Small Business
Coast Aerospace Manufacturing, Inc.	Small Disadvantaged Business
Coast Composites, Inc.	Small Business
Coastal Component Industries	Woman-Owned Small Business
Coastal Steel, Inc.	Veteran-Owned Small Business
Coastline International	Woman-Owned Small Business
Coastline Metal Finishing	Small Business
Cobalt Enterprises	Small Business
Colamco, Inc.	Small Disadvantaged Business
Coleman Machine	Woman-Owned Small Business
Collier Research & Development Corp.	Small Business
Colonial Wire and Cable	Small Business
Colorado Waterjet Company	Veteran-Owned Small Business
Command & Control Environmental	Small Business
CommTech	Small Business

COMPANY NAME	SOCIOECONOMIC CATEGORY
Comskil, Inc.	Small Business
Concurrent Computer Corp.	Small Business
Consolidated Precision Product	Small Business
Constitution Cable Products, Inc.	Small Business
Container Consulting Service	Woman-Owned Small Business
Continental Cable	Small Business
Continental Coatings, Inc.	Small Disadvantaged Business
Cotsworks	Small Business
Corsair Engineering	Veteran-Owned Small Business
Creative Machining Systems	Woman-Owned Small Business
Creative Power Resources, Inc.	Veteran-Owned Small Business
Crescent Sound & Light, Inc.	Small Business
Crestwood Technology Group	Woman-Owned Small Business
Crickit Computers, Inc.	Woman-Owned Small Business
Criteria Labs	Small Business
CS Business Systems	Small Business
CSBZone, Inc.	Historically Underutilized Business Zone Concern
Cubrc, Inc.	Small Business
Cullimore & Ring Technologies, Inc.	Small Business
Cummings Aerospace	Small Business
Curtiss-Wright Controls	Small Disadvantaged Business
Custom System Integration	Small Business
Cutting Edge Tool Supply	Small Business
Cyberresearch, Inc.	Small Business
Cytec Engineered Materials, Inc.	Small Business
Cytec Industries, Inc.	Small Business
Daniels Manufacturing Corp.	Veteran-Owned Small Business
DAP USA, Inc.	Small Business
Dassault Systems Americas Corp.	Small Business
Dataforth Corp.	Small Business
Datatronics Romoland, Inc.	Woman-Owned Small Business
Dawn VME Products	Service-Disabled Veteran–Owned Small Business
DCT Systems Group, Inc.	Woman-Owned Small Business
Deep Space Systems, Inc. ★	Woman-Owned Small Business
Delta Microwave	Veteran-Owned Small Business
Denelex Industries	Small Business
Denver Fine Cabinetry	Small Business
Denver Fluid System Technologies	Small Business
Denver Wire Rope & Supply, Inc.	Small Business
Dexmet Corp.	Small Business

List of Supporting Small Businesses (Continued)

COMPANY NAME	SOCIOECONOMIC CATEGORY
Dexter Magnetic Technologies, Inc.	Small Business
Die Cut Technologies	Small Business
Directed Light	Small Business
Directed Manufacturing, Inc.	Small Business
DIT-MCO International	Veteran-Owned Small Business
Diversified Industrial Products	Woman-Owned Small Business
DKI	Woman-Owned Small Business
DME Products and Systems, Inc.	Small Disadvantaged Business, Woman-Owned Small Business, Historically Underutilized Business Zone Concern
Donatech Corp.	Historically Underutilized Business Zone Concern
Dunmore Corp.	Small Business
Dupree	Small Business
Drake Plastics, Ltd.	Small Business
Drive Savers, Inc.	Small Business
Dynamic Engineering	Small Business
Dynamic Enterprises, Inc.	Woman-Owned Small Business
Dynavac	Small Business
EaglePicher Technologies, LLC, Yardney Division	Veteran-Owned Small Business
Eagle Circuits, Inc.	Small Business
Easter Owens	Small Business
Ecliptic Enterprises	Historically Underutilized Business Zone Concern
Edge Space Systems ★	Woman-Owned Small Business
Edmund Optics, Inc.	Woman-Owned Small Business
EIS, Inc.	Small Business
Electric Cloud, Inc.	Small Business
Electro Enterprises, Inc.	Woman-Owned Small Business
Electro Magnetic Applications, Inc.	Small Business
Electro Plate Circuitry, Inc.	Small Disadvantaged Business
Electrospec, Inc.	Veteran-Owned Small Business
Elgiloy Limited	Small Business
Ellsworth Adhesives Systems	Small Business
Elma Electronic, Inc.	Small Business
Elna Ferrite Laboratories	Woman-Owned Small Business
ELORET ★	Small Business
EMA Design Automation, Inc.	Veteran-Owned Small Business
Emerald Performance Materials	Small Business
Emergent Space Technologies	Small Business
EMF, Inc.	Small Business

COMPANY NAME	SOCIOECONOMIC CATEGORY
Enfasco	Small Business
Engineering Resource Group, Inc.	Small Business
Engravers Metal Fabricators	Small Business
Equipto Electronics Corp.	Small Disadvantaged Business
Error Prevention Institute, Inc.	Small Business
Eugene J. Horak	Small Business
Evans Capacitor	Small Business
Evans Precision	Veteran-Owned Small Business
Excalibur Machine	Woman-Owned Small Business
Executive Information Systems, LLC	Small Business
F&R Sales, Inc.	Small Business
Fairview Microwave	Small Business
Falcon Electronics, Inc.	Small Disadvantaged Business
Faro Technologies	Small Business
Fastenal Company	Small Business
Fastener Depot	Woman-Owned Small Business
Femtotek	Small Business
Ferrari Technical Sales, Inc.	Veteran-Owned Small Business
Fiber Materials, Inc. ★	Veteran-Owned Small Business
Fibertek	Small Business
Fiero Fluid Power, Inc.	Small Business
Fine Line Stencil, Inc.	Veteran-Owned Small Business
Finishing Professionals, LLC	Small Disadvantaged Business, Veteran-Owned Small Business, Historically Underutilized Business Zone Concern
Firstmark Aerospace	Small Business
Flexial	Small Business
Flame Enterprises	Small Business
Flotron, Inc.	Small Business
Flow Systems, Inc.	Small Business
Forsythe Solutions Group	Small Business
Friedrich, Klatt and Associates	Small Business
Front Line Solutions, Inc.	Service-Disabled Veteran–Owned Small Business
Front Panel Express, LLC	Small Business
Frontier Electronic Systems Corp.	Woman-Owned Small Business, Native-American Business Enterprise
FUTEK Advanced Sensor Technology, Inc.	Small Business
Futuramic Tool & Engineering	Small Business
G & D Machine Shop	Woman-Owned Small Business
GC Micro Corp.	Woman-Owned Small Business
G Systems, L.P.	Woman-Owned Small Business

COMPANY NAME	SOCIOECONOMIC CATEGORY
Gallup Printing	Small Business
Garrett Electronics	Veteran-Owned Small Business
General Devices	Small Business
General Magnaplate Corp.	Woman-Owned Small Business
General Office Supply Company, Inc.	Small Business
General Plastics Manufacturing Company	Small Business
General Products Partners	Small Business
General Tool Company	Small Business
Geodetic Systems, Inc.	Small Business
Geomagic, Inc.	Small Business
George Industries, Inc.	Small Business
Gerbig Engineering	Small Business
Gevens Engineering	Small Business
GHG Corp. ★	Small Disadvantaged Business, Service-Disabled Veteran–Owned Small Business, Hispanic American
Glass Parametrics, Inc.	Small Business
Global Technology Resources, Inc.	Historically Underutilized Business Zone Concern
Global Tooling Systems, Inc.	Small Business
GMS International Corp.	Veteran-Owned Small Business
Gras Na, Inc.	Small Business
Green Hills Software, Inc.	Small Business
Groov-Pin	Small Business
Group Hana, LLC	Small Business
Guardian Edge Technology, Inc.	Small Business
H&E Equipment	Small Business
H&H Industries	Small Business
Haigh-Farr, Inc.	Small Business
Hardware, Inc.	Woman-Owned Small Business, Historically Underutilized Business Zone Concern
Hawk Electronics	Small Business
Hawkeye International	Woman-Owned Small Business
HD Communications	Small Business
Helind Electronics, Inc.	Small Business
Herber Aircraft Service	Small Business
Hickey & Associates, LLC	Small Business
High Speed CNC	Small Business
Highland Industries, Inc.	Small Business
Highland Technology	Small Business
His Company, Inc.	Small Business

COMPANY NAME	SOCIOECONOMIC CATEGORY
Hi-Tek Professionals, Inc.	Small Business
Hoefner	Small Business
Holt Tool and Die Company of California	Veteran-Owned Small Business
Honeybee Robotics, Ltd. ★	Small Business
Houston Precision Fastener, LLC ★	Small Business
HR Strategies and Solutions, LLC	Woman-Owned Small Business, Veteran-Owned Small Business, Historically Underutilized Business Zone Concern
Hubbs Machine & Manufacturing	Small Business
Huntsville Fastener	Small Business
Humphreys & Associates, Inc.	Small Business
Hurlen Corp.	Small Disadvantaged Business
IEH Corp.	Small Business
Ihly Industries, Inc.	Small Business
Imagineering Enterprises	Small Business
Imagevision, Inc.	Small Business
Indiana Aircraft Hardware	Veteran-Owned Small Business
Indium Corporation of America	Small Business
Industrial Chemicals Corp.	Veteran-Owned Small Business
Infiniti Engineering, Inc.	Small Business
Infinity Technology, Inc.	Woman-Owned Small Disadvantaged Business
Infragistics, Inc.	Small Business
Ingersoll Machine Tools	Small Business
Innotech Machining	Veteran-Owned Small Business
Innovative Integration	Small Business
Innovation First, Inc.	Small Business
Innoventor, Inc.	Small Business
In-Phase Technologies, Inc.	Veteran-Owned Small Business
Instar Engineering	Small Business
Insulation Supply Company	Small Business
InsulFab Plastics	Small Business
In Tec	Veteran-Owned Small Business
Integral Products	Small Business
Intek, Inc.	Woman-Owned Small Business
Interface Corp.	Woman-Owned Small Business
Interface Welding	Woman-Owned Small Business
Intermountain Testing	Small Business
International Crystal Manufacturing Company	Small Business
Interstate Connecting Components	Small Business

List of Supporting Small Businesses (Continued)

COMPANY NAME	SOCIOECONOMIC CATEGORY
Interstate Wire Company	Small Business
ISO Group, Inc.	Small Business
Isolation Dynamics	Small Business
Isolink, Inc.	Small Business
Isotek Corp.	Small Business
ISYS Technologies	Woman-Owned Small Business
ITI TranscenData	Small Business
J & J Paper & Packaging, Inc.	Small Business
J & M Aerospace, LLC	Woman-Owned Small Business
J. M. Canty Associates, Inc.	Small Business
J3 Associates, Inc.	Veteran-Owned Small Business
Jackson & Tull	Small Disadvantaged Business
Jackson Bond Enterprises	Small Business
Janicki Industries, Inc.	Small Business
Jarvis Supply Company, Inc.	Small Business
Jay/Enn Corp.	Small Business
JD Machine	Small Business
Jergens	Woman-Owned Small Business
JFA Avionics Systems, Inc.	Small Disadvantaged Business
JFW Industries, Inc.	Small Business
Jinfonet Software, Inc.	Small Business
John William Aaron	Small Business
Joining Technologies	Small Business
Jointwave Technology	Small Business
Jolt Technology, Inc.	Small Business
Jordy & Company	Small Business
Joseph T. Ryerson & Son, Inc.	Small Business
JPS Composite Materials Corp.	Small Business
JRH Electronics	Small Disadvantaged Business, Woman-Owned Small Business
Justin Electronics, Inc.	Small Business
K. R. Anderson Company	Small Business
Katzke Paper	Small Business
Kensington Electronics, Inc.	Small Business
Kern Engineering & Manufacturing	Small Business
Kerr Panel Manufacturing	Small Business
Koaxis, Inc.	Small Business
KPM Engineering	Small Business
Krayden, Inc.	Small Business
Krohn-Hite Corp.	Small Business
Krytar	Small Business
KST Data, Inc.	Small Business

COMPANY NAME	SOCIOECONOMIC CATEGORY
KT Engineering	Small Business
Kulite Semiconductor	Woman-Owned Small Business
Kurt J. Lesker Company	Veteran-Owned Small Business
Laminated Shim Company, Inc.	Small Business
Lamsco West, Inc.	Small Business
Lansmont Corp. ★	Service-Disabled Veteran–Owned Small Business
Laser Projection Technologies	Small Business
LDRA Technology, Inc.	Small Disadvantaged Business
Leader Global Technologies	Small Business
Lee Spring Company	Small Business
Lenape Forged Products Corp.	Small Business
Lewis L. Tew Company	Small Business
LGS Technologies, Inc.	Small Business
Liburdi Dimetrics Corp.	Small Business
Lifline	Small Disadvantaged Business, Veteran-Owned Small Business
Lift-A-Loft Corp.	Small Business
Lift-It Manufacturing Company	Small Business
Lift Power	Small Business
Lit Con Group, LLC	Small Business
Livermore Software Technology Corp.	Small Business
Lockstep Technologies	Woman-Owned Small Business
Lordon Engineering	Woman-Owned Small Business
Lou-Con, Inc.	Veteran-Owned Small Business
LSQ Funding Group	Small Disadvantaged Business
LT Consulting and Training, LLC	Veteran-Owned Small Business
Lumistar, Inc.	Small Business
Lynco Grinding Company	Veteran-Owned Small Business
LZ Technology	Woman-Owned Small Business
M&M Jig Grinding, Inc.	Small Business
M&P International, Inc.	Small Business
M. S. Kennedy Corp.	Small Business
M2 Global Technology, Ltd.	Service-Disabled Veteran–Owned Small Business
Machine Craft, Inc.	Woman-Owned Small Business
Magellan Distribution Corp.	Small Business
Magnatrol Valve Corp.	Small Business
Magnetic Inspection Labor	Small Business
Magnetic Windings Company, Inc.	Small Business
Magnetics Test Lab	Woman-Owned Small Business, Veteran-Owned Small Business

COMPANY NAME	SOCIOECONOMIC CATEGORY
Majestic Metals	Small Business
Major Tool & Machine	Small Business
Marlin Manufacturing Corp.	Woman-Owned Small Business
Mar-Tek Industries	Woman-Owned Small Business
Martinez & Turek, Inc.	Small Disadvantaged Business
Marway Power Systems, Inc.	Small Business
Maryland Cork Company, Inc.	Small Business
Masaga Supply	Woman-Owned Small Business
Maximator Test, LLC	Small Business
Maxwell Technologies	Small Business
Mcad Design, Inc.	Woman-Owned Small Business
McCaffrey & Associates	Small Business
McCormick Stevenson	Small Business
McKnight Associates, Inc.	Small Business
MDC Vacuum Products, LLC	Small Business
Meadowlark Optics	Small Business
Measurement Specialists, Inc.	Small Business
Medtherm Corp.	Small Business
Megatel Industries Corp.	Small Business
MEI Technologies	Service-Disabled Veteran–Owned Small Business
Mektech Composites, Inc.	Veteran-Owned Small Business
Melmat	Small Business
Memkor	Small Business
MEN Micro, Inc.	Small Business
Metal Fishing Company	Small Business
Metal Textiles Corp.	Small Business
Metalex Manufacturing, Inc.	Veteran-Owned Small Business
MetalMart International, Inc.	Small Business
Met-Con	Small Business
Metro Machine, Inc.	Veteran-Owned Small Business
Micro Craft	Small Business
Micro Lambda	Small Business
Micro Mode Products, Inc.	Small Business
Microcircuits	Small Business
Micro-Coax, Inc.	Small Business
Micro-Metrics, Inc.	Small Business
Micropac Industries, Inc.	Small Business
Microsemi Corp.	Veteran-Owned Small Business
Microwave Components, Inc.	Small Business
Microwave Engineering	Woman-Owned Small Business
Microwave Monolithics	Small Disadvantaged Business

COMPANY NAME	SOCIOECONOMIC CATEGORY
Midcom Corp.	Woman-Owned Small Business
Middle Atlantic Products, Inc.	Small Business
Middleburg Yarn Processing	Small Business
Mile High Rigging	Small Business
Milestek Corp.	Small Business
Miller Technology Group	Woman-Owned Small Business
Miller-Stephenson Chemical Company	Veteran-Owned Small Business
Mini Systems, Inc.	Veteran-Owned Small Business
Mission Solutions Engineering	Small Business
Miteq	Small Business
Mod Electronics, Inc.	Small Business
Models & Tools	Small Business
Morgan Advanced Materials	Small Business
Motivational Kicks	Woman-Owned Small Business
Mountain States Finishing, Inc.	Veteran-Owned Small Business
MRI Technologies	Small Disadvantaged Business, Woman-Owned Small Business
MS Aerospace, Inc.	Small Business
MT Acquisitions, LLC	Woman-Owned Small Business
Mu-Del Electronics, Inc.	Small Business
Muller-BBM Vibroacoustic Systems	Small Business
Multek Flexible Circuits	Small Business
MWS Precision Wire Industries, Inc.	Small Business
MWT Materials, Inc.	Small Business
Nallatech, Inc.	Small Business
ND Industries, Inc.	Small Business
NEA Electronics, Inc.	Small Business
Net Optics	Small Business
New River Kinematics, Inc.	Small Business
New Yorker Electronics	Woman-Owned Small Business
Newark Corp.	Veteran-Owned Small Business
Neway Packaging Corp.	Small Business
Newcomb Spring Corp.	Small Business
Next Intent	Woman-Owned Small Business
Nextlevel Strategic Solution, Inc.	Small Business
Nichols Manufacturing	Small Disadvantaged Business, Woman-Owned Small Business
Nishkian Dean Consulting	Small Business
Nitrex, Inc.	Small Business
Nook Industries, Inc.	Veteran-Owned Small Business
Norman Filter Company	Small Business
North Atlantic Industries	Small Business

List of Supporting Small Businesses (Continued)

COMPANY NAME	SOCIOECONOMIC CATEGORY
North Hills Signal Processing	Small Business
North Texas Circuit Board Company	Small Business
NSN Specialty, LLC	Woman-Owned Small Business
NuSil Technology	Small Business
Nye Lubricants, Inc.	Veteran-Owned Small Business
Odin Metrology, Inc.	Small Business
Odyssey Space Research, LLC ★	Woman-Owned Small Business
Ojeda's Technical Solutions	Small Business
Oliver H. Van Horn Company, LLC	Woman-Owned Small Business
Omnitron Systems Technology	Small Business
Oneida Research Services, Inc.	Small Business
Optimal Solutions Software, LLC	Small Business
Orcon Corp.	Small Business
Orlando Shred-It, Inc.	Woman-Owned Small Business
Oxley	Small Business
Oxygen Electronics, LLC	Small Business
PTR-Precision Technologies	Small Business
Paal Technologies	Woman-Owned Small Business
Pacific Flexible Metal Hose Company	Small Business
Pacific Scientific Energetic Materials Company	Small Business
Paneltec Corp.	Small Business
PaR Systems, Inc.	Small Business
Paradigm Design and Manufacturing	Small Disadvantaged Business
Paradigm Systems Integrators, LLC	Veteran-Owned Small Business
Paragon Space Development Corp.	Woman-Owned Small Business
Parker Hannifin Corp.	Small Business
PartMiner, Inc.	Small Business
Pasternack Enterprises, Inc.	Small Business
Pawling Engineered Products	Small Business
Pave Technology Company	Small Business
Paydarfar Industries, Inc.	Small Business
PC Mall Gov, Inc.	Small Business
PC Specialists	Small Business
PCA Aerostructures Company	Small Business
PCC Schlosser	Small Business
PCM Products	Small Business
PCNation	Small Business
Peak Media, Inc.	Woman-Owned Small Business
Peerless Aerospace Fasteners	Small Business
PEI-Genesis, Inc.	Small Business
Penguin Computing, Inc.	Small Business

COMPANY NAME	SOCIOECONOMIC CATEGORY
Pennoyer-Dodge Company	Woman-Owned Small Business
Peregrine Falcon Corp.	Small Business
Petrou Industries, Inc.	Small Business
PH Tool Reference Standard	Small Business
Phoenix Analysis and Design	Small Business
Phoenix Integration, Inc.	Small Business
Photo Chemical Systems of Florida	Small Business
Pickering Interfaces	Small Business
Pico Electronics	Small Business
Pierce Aluminum Company	Small Business
PIF, Inc. (Hydrodyne)	Veteran-Owned Small Business
Pioneer Circuits, Inc.	Small Business
Plasco Corp.	Service-Disabled Veteran–Owned Small Business
Plascore	Small Business
Pointwise, Inc.	Small Business
Polar Leasing Company	Woman-Owned Small Business
Powell Electronics, Inc.	Small Business
Power Product Technologies, Inc.	Woman-Owned Small Business
PRC-DeSoto-La	Small Business
Precision Fabricating & Cleaning	Small Business
Precision Industries, Inc.	Small Business
Precision Machining Sheet Metal	Woman-Owned Small Business
Precision Measurements	Woman-Owned Small Business
Presidio Components	Small Business
Primus Metals	Small Business
Process Fab, Inc.	Small Business
Productivity Apex, Inc.	Small Disadvantaged Business, Woman-Owned Small Business
Programmers Paradise, Inc.	Small Business
Provantage Corp.	Small Business
Project Management Technologies, Inc.	Service-Disabled Veteran–Owned Small Business
ProTech Sales, Inc.	Veteran-Owned Small Business
Proteus Dimensional Technologies	Small Business
Protogenic, Inc.	Small Business
Pulizzi Engineering, Inc.	Small Business
Pulse Research Lab, Inc.	Woman-Owned Small Business
Q-Tech Corp.	Woman-Owned Small Business
Quality Machining & Design	Small Business
Qualtech Systems	Small Disadvantaged Business
Quell Corp.	Small Business
Quest Components, Inc.	Small Business

COMPANY NAME	SOCIOECONOMIC CATEGORY
Quest One	Woman-Owned Small Business
Questar, Inc.	Small Business
Qwaltec	Small Business
RRA Corp.	Small Business
RF Industries	Small Business
RS Hughes Company	Small Business
R-Con NDT	Small Business
RACO Industries, LLC	Small Business
Ragsdale Industries, Inc.	Small Business
Randolph Products Company	Veteran-Owned Small Business
Rapid Circuits, Inc.	Small Business
Rayotek Scientific, Inc. ★	Small Disadvantaged Business, Hispanic American
RDF Corp.	Small Disadvantaged Business, Woman-Owned Small Business
RDP Electrosense, Inc.	Small Business
Red River Computer Company	Small Business
Red Canyon Software, Inc.	Veteran-Owned Small Business, Historically Underutilized Business Zone Concern
Regal Cutting Tools	Small Business
Regal-Piedmont Plastics	Small Business
Reid Supply Company	Small Business
ReleaseTEAM, Inc.	Small Business
ReliaSoft Corp.	Small Business
Renton Coil Spring	Small Business
Resin Technology Group, Inc.	Small Business
Resistance Temperature Detector Company	Small Business
Revchem Plastics, Inc.	Small Business
Reyco Precision Machining	Small Business
Riedon, Inc.	Small Business
RJR Circuits, Inc.	Small Disadvantaged Business, Woman-Owned Small Business
Robert Hadley Company	Small Business
Robin Materials, Inc.	Small Business
Rochester Electronics, LLC	Small Business
Rocket Seals Corp.	Woman-Owned Small Business
Rockwood Pigments	Small Business
Rocky Mountain Air	Small Business
Rocky Mountain Raegants, Inc.	Small Business
Rocky Mountain Recycling, Inc.	Small Business
Rogers Wire EDM Service, Inc.	Small Business

COMPANY NAME	SOCIOECONOMIC CATEGORY
Root International	Small Business
Rosenberger-Toth	Small Business
Ross Engineering Corp.	Veteran-Owned Small Business
Roy Estess	Small Business
RSI, Inc.	Small Disadvantaged Business
RTI Remmele Engineering, Inc.	Small Business
Rubbercraft Corp.	Small Business
Rust Automation & Controls, Inc.	Small Business
S & S Tool and Machine Company	Woman-Owned Small Business
Saber Design and Analysis Services	Woman-Owned Small Business
SABIC Innovative Plastics US	Small Business
Safe, Inc.	Veteran-Owned Small Business
Safeware Engineering Corp.	Woman-Owned Small Business
Sage Black Consulting	Small Disadvantaged Business, Woman-Owned Small Business
Samtec	Small Business
San Diego Composites	Small Business
Sauereisen	Small Business
Schnee-Morehead, Inc.	Small Business
Schry-Way Cases	Small Business
Scot, Inc.	Small Business
SDM & Associates, Inc.	Small Disadvantaged Business, Woman-Owned Small Business, Historically Underutilized Business Zone Concern
Sea Wire and Cable, Inc.	Woman-Owned Small Business
SEAKR Engineering, Inc. ★	Small Business
Seal Science	Small Business
Sealing Devices	Veteran-Owned Small Business
Seegra	Small Business
Semicoa Corporation	Small Business
Sensor Products, Inc.	Small Business
Servtronics, Inc.	Small Business
Sey Tec, Inc.	Woman-Owned Small Business
Shapes Group, Ltd.	Small Business
Sharp Dimension	Small Business
Sheffield Precision Ceramics, Inc.	Small Business
SHI International Corp.	Woman-Owned Small Business
Shop Tools, Inc.	Small Business
Shore Microsystems Corp.	Small Business
Sierra Circuits	Small Business
Sierra Lobo, Inc. ★★★	Small Disadvantaged Business, Hispanic American

List of Supporting Small Businesses (Continued)

COMPANY NAME	SOCIOECONOMIC CATEGORY
Smalley Steel Ring Company	Small Business
Smith Brothers Tool Company	Small Business
Smiths Tubular Systems	Small Business
Solid State Devices	Small Business
Southland Precision, Inc.	Small Business
Southern California Braiding ★	Small Business, Historically Underutilized Business Zone Concern
Southern Gear & Machine, Inc.	Veteran-Owned Small Business
Spacecoast Cable & Harness	Small Business
Special Aerospace Services	Woman-Owned Small Business
Specialized Packaging Solutions, Inc.	Woman-Owned Small Business
Specialized Products Company	Woman-Owned Small Business
Specialty Cellular Products Company	Woman-Owned Small Business
Specialty Polymers	Small Business
Spectracom	Small Business
Spenro Industrial Supply	Veteran-Owned Small Business
Spirent Federal Systems, Inc.	Small Business
Springs Fabrication	Small Business
SRSA Commercial Real Estate, Inc.	Small Business
St. Vrain Manufacturing, Inc.	Small Business
Stadco	Small Business
Stag Enterprise, Inc.	Small Disadvantaged Business, Woman-Owned Small Business, Veteran-Owned Small Business
Stanford Mu Corp.	Small Business
Star Case Manufacturing	Small Business
Starfish Network, Inc.	Small Business
Stars & Stripes Aerospace	Small Disadvantaged Business, Woman-Owned Small Business, Historically Underutilized Business Zone Concern
StarTech.com USA	Small Business
State of the Art, Inc.	Small Business
Steen Machining, Inc.	Small Business
Stellar Industries	Veteran-Owned Small Business
Stellar Solutions, Inc.	Woman-Owned Small Business
Sterling Computers Corp.	Small Disadvantaged Business, Woman-Owned Small Business, Historically Underutilized Business Zone Concern
Sterling Edge Industrial	Small Business
Stewart R. Browne Manufacturing Company	Small Business
Storm Manufacturing Corp.	Historically Underutilized Business Zone Concern

COMPANY NAME	SOCIOECONOMIC CATEGORY
Strainsert Company	Small Business
Stratical Solutions, Inc.	Small Business
Strohwig Industries	Small Business
Struble Fluid Power Company	Small Business
Summation Research, Inc.	Small Business
Sunshine Metals	Small Business
Sunstone Circuits, LLC	Small Business
Superbolt, Inc.	Small Business
Superior Metal Products	Small Business
Supportek, Inc.	Small Business
SVE Autobody	Woman-Owned, Service-Disabled Veteran–Owned Small Business
Syncom Specialties	Small Business
Systima Technologies	Small Business
Syzygyx, Inc.	Woman-Owned Small Business
TBC Consoles	Small Business
Taber Acquisition Corp.	Small Business
Tallac Technology, LLC	Small Business
Tandem Solutions, Inc.	Veteran-Owned Small Business
Tandemloc, Inc.	Small Business
Tavis Corp.	Small Business
Tayco Engineering, Inc.	Small Business
Techflex	Small Business
Techmar Corp.	Small Business
Techni-Tool, Inc.	Small Business
Technisys, Inc.	Woman-Owned Small Business
Technobox, Inc.	Small Business
Technology Marketing, Inc.	Small Business
TechSmith Corp.	Small Business
Teletronics Technology Corp.	Small Business
Temperature Processing Company	Veteran-Owned Small Business
Terra Universal	Small Business
TestEquity, LLC	Small Business
TestPath, Inc.	Small Business
TEVET	Service-Disabled Veteran–Owned Small Business, Historically Underutilized Business Zone Concern
Texas Almet, Inc.	Small Business
The All Star Group Companies	Small Disadvantaged Business, Service-Disabled Veteran–Owned Small Business
The Bergquist Company	Small Business
The Cleveland Electric	Small Business

COMPANY NAME	SOCIOECONOMIC CATEGORY
The Go To Group	Small Business
The Goebel Company	Small Business
The Jorgensen Forge Corp.	Small Business
S. F. Travis Company	Small Business
Thermoelectric Cooling America	Small Business
Thermophysical Properties Research Lab	Small Business
Thern, Inc.	Small Business
Third Millennium Productions	Small Business
ThunderCat Technology, LLC	Service-Disabled Veteran–Owned Small Business
Timbercon, Inc.	Small Business
Timberline Steel, Inc.	Small Business
Tintronics Industries	Service-Disabled Veteran–Owned Small Business
Titusville Tool and Engineering Company	Woman-Owned Small Business
Tommy W. Holloway	Small Business
TPS Aviation	Small Disadvantaged Business
TransPak, Inc.	Woman-Owned Small Business
Transwest Trucks, Inc.	Service-Disabled Veteran–Owned Small Business
Trenton Systems	Small Business
Tri-Tech Metals, Inc.	Service Disadvantaged Business
TTJ&B, Inc.	Small Business
TTTech North America	Small Business
T-Vec Technologies, Inc.	Small Business
UFC Aerospace Corp.	Small Business
Undercover Canvas & Upholstery	Small Business
Uniquip Plus, Inc.	Small Business
Universal Semiconductor, Inc.	Woman-Owned Small Business
University of Texas at El Paso	NP Ed Inst HBCU/MSI/TCU
US Precision Mold	Small Business
Valcor Engineering	Small Business
Valin Corp.	Small Business
ValveTech	Small Business
Van Brakel Electronic, Inc.	Small Business
Vanguard Electronics Company	Woman-Owned Small Business
Vantage Systems, Inc.	Small Disadvantaged Business
Vectrona	Veteran-Owned Small Business
Vincent T. Tate	Small Disadvantaged Business
Vip Manufacturing & Engineering	Small Business
Virginia Panel Corp.	Woman-Owned Small Business
Virtual Enterprises, Inc.	Small Business

COMPANY NAME	SOCIOECONOMIC CATEGORY
Virtutech, Inc.	Small Business
Vishay Transducers, Ltd.	Small Business
Visioneering, Inc.	Small Business
Vistagy, Inc.	Small Business
Vitols Tool & Machine Corp.	Small Business
VMware, Inc.	Small Business
Voss Industries	Small Business
Votaw Precision Technologies ★	Woman-Owned Small Business
VPT, Inc.	Small Business
Waco Electronics	Small Business
Walker Component Group	Small Business
Walter G. Legge Company	Small Business
Walter J. Barnes Electric Company	Small Business
Warehouse Cables	Veteran-Owned Small Business
Watkins & Associates, Inc.	Woman-Owned Small Business
Welch Fluorocarbon	Small Business
WessDel, Inc.	Woman-Owned Small Business
West Coast Gasket Company	Small Business
Western Filament	Small Business
Western Rubber & Supply	Small Business
Western Sales & Testing of Amarillo	Woman-Owned Small Business
Western Sling Company	Veteran-Owned Small Business
Western States Sales	Small Business
Westmoreland Mechanical Testing and Research, Inc.	Small Business
Whitmor/Wirenetics	Small Business
Wideband Systems, Inc.	Small Business
Winn-Star, Inc.	Veteran-Owned Small Business
Winslow Crane Service Company	Small Business
WireMasters, Inc.	Small Business
WITTENSTEIN Aerospace	Small Business
Yardney Technical Products, Inc.	Veteran-Owned Small Business
Z Tech International, Inc.	Small Business
Zel Technologies	Small Disadvantaged Business, Veteran-Owned Small Business
Zimmerman Metals, Inc.	Small Business
ZIN Technologies ★	Small Business

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